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Limited research suggests a link between Attention-Deficit/ Hyperactivity Disorder (AD/HD) and adolescent risky sexual behavior (Barkley, 1998). Yet, no known research has examined mechanisms, pathways, or interactions that may explain or affect this relationship. To address this gap in the literature, this study simultaneously examined multiple risk factors that may place adolescents with AD/HD on a pathway to sexual risk-taking. Participants included one hundred 15-18-year-old males and females, one-third of whom met stringent DSM-IV criteria for AD/HD. Youth and their caregivers completed questionnaires and interviews assessing AD/HD symptoms, comorbid difficulties, and sexual risk-taking. Youth with AD/HD who were *not* taking medication reported greater sexual risk-taking than medicated youth or non-AD/HD youth. Mediation analyses revealed that AD/HD symptoms may lead to sexual risk-taking through academic failure and delinquency. Having an unmarried parent and engaging in greater substance use moderated the relationship between AD/HD and risky sexual behavior. These findings indicate that youth with AD/HD may, in fact, disproportionately experience sexual risk-taking, but this may only be the case when AD/HD is untreated or accompanied by other risk factors. Implications for future research and interventions for youth with AD/HD were discussed.

THE ASSOCIATION BETWEEN ATTENTION-DEFICIT/
HYPERACTIVITY DISORDER AND ADOLESCENT
RISKY SEXUAL BEHAVIOR

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To H. Martin Gabalda,
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CHAPTER I

INTRODUCTION

Adolescents with Attention-Deficit/Hyperactivity Disorder (AD/HD; American Psychiatric Association, 1994) face a variety of struggles that may impact the successful transition from childhood to adulthood (see Barkley, 2004). Research has shown, for example, that youth with AD/HD often struggle academically, have strained relationships with family and peers, and engage in risky behaviors such as delinquency, substance use, and risky sexual activity (Barkley, 1998; Barkley, 2002). Although clinically it has been recognized that adolescents with AD/HD are prone to risky sexual behavior and its consequences, these impressions have not been thoroughly studied. In light of the gaps in knowledge surrounding the relationship between AD/HD and risky sexual behavior among adolescents, the purpose of this study was to further examine this relationship.

This introduction section begins with an overview of AD/HD as it affects children and adolescents. This is followed by a summary and critical analysis of current findings on the relationship between AD/HD and risky sexual behavior. Next, several hypothetical pathways leading from AD/HD to risky sexual behavior are outlined, and the pathways are then integrated and summarized. Finally, research questions and hypotheses are presented.

Overview of AD/HD

AD/HD is a psychological disorder characterized by developmentally inappropriate symptoms of hyperactivity-impulsivity and/or inattention that begin during early childhood, persist over time, and significantly impact functioning (APA, 1994). There are three major subtypes of AD/HD: Predominantly Inattentive, Predominantly Hyperactive-Impulsive, and Combined. These subtypes are determined on the basis of whether six or more symptoms are present in either or both domains. AD/HD occurs in about 3-5% of the childhood population, with about three times as many boys as girls diagnosed in community samples (APA, 1994).

AD/HD in Childhood

Most children with AD/HD suffer from at least one comorbid or co-occurring disorder, such that “pure” AD/HD without comorbidity is relatively uncommon (Kadesjo & Gillberg, 2001; Jensen, Martin, & Cantwell, 1997). Conduct problems are exceptionally prevalent in youth with AD/HD and are a major cause of concern for parents and teachers (Barkley, 1998). By late childhood, at least 40% of children with AD/HD meet diagnostic criteria for Oppositional Defiant Disorder (ODD), and about 25% display symptoms of more serious antisocial behavior (e.g., lying, stealing, and fighting) and meet diagnostic criteria for Conduct Disorder (CD; Barkley, 1998; Hazell et al., 2006). Thus, children with AD/HD have a ten-fold risk for having ODD or CD (Angold, Costello, & Erkanli, 1999). Having AD/HD also increases risk for other difficulties in childhood. The majority of students with AD/HD exhibit academic

performance problems (Mannuzza & Klein, 2000; Cantwell & Baker, 1991). Perhaps because of the frustration and negative feedback that these children encounter, there is also a substantial overlap between AD/HD and depression in childhood (Kitchens, Rosen, & Braaten, 1999).

By and large, the proposition that psychosocial disadvantage or family chaos cause AD/HD is not supported (Levy, Hay, McStephen, Wood, & Waldman, 1997). Nevertheless, families influence the developmental course, severity, and long-term outcomes of AD/HD (Johnston & Mash, 2001). Bothersome AD/HD behaviors may act as a catalyst for coercive parent-child interactions, as they evoke and often elude parental control efforts (Danforth, Barkley, & Stokes, 1991). Thus, although AD/HD symptoms are unlikely to be caused by family environment, disruptive child AD/HD behaviors may initially spark the types of ineffective parenting that give rise to conduct problems (Loeber et al., 2000). In fact, parenting style is often disrupted in parents of children with AD/HD and the emotional climate of the parent-child relationship suffers (Cunningham & Barkley, 1979; Shelton et al., 1998). Such disruption to parenting may have two undesirable outcomes for children with AD/HD. First, ineffective parenting may contribute to worsening and persistence of AD/HD symptoms (Woodward, Taylor, & Dowdney, 1998). Second, disrupted parenting style and practices may lead to comorbid conduct problems, risk behaviors such as substance use and risky sexual activity, increased school failure, or internalizing problems (Steinberg, Darling, & Fletcher, 1995; Colder, Lochman, & Wells, 1997). By late childhood, the interaction between child

AD/HD and ineffective parenting style may solidify and exacerbate any adjustment problems that have already taken root (see Barkley, 1998; Johnston & Mash, 2001).

AD/HD in Adolescence

During adolescence, growing academic and social demands place an added burden on youth with AD/HD. Although previously considered a childhood disorder, research shows that 50-80% of childhood cases of AD/HD continue to show significant symptomatology in adolescence (Barkley, Fischer, Smallish, & Fletcher, 2002; Weiss & Hechtman, 1993). AD/HD symptoms generally decline across development (Hart, Lahey, Loeber, Applegate, & Frick, 1995), with some adolescent cases ceasing to meet stringent DSM-IV diagnostic criteria for the disorder. Yet, importantly, most are still impaired in several domains and their symptoms remain developmentally deviant (Barkley, 1998). By young adulthood, roughly 60% of cases continue to meet DSM-IV diagnostic criteria based on parent report (Barkley et al., 2002).

Especially among children with oppositional behavior during childhood, youth with AD/HD may develop increasingly severe conduct problems as teenagers. Adolescents with AD/HD are up to four times more likely to display Conduct Disorder than those without AD/HD (Barkley, Anastopoulos, Guevremont, & Fletcher, 1991). Adolescents with AD/HD also consistently report using cigarettes, alcohol, and illegal drugs at higher rates than normal adolescents (Gittelman, Mannuzza, Shenker, & Bonagura, 1985; Lynskey & Fergusson, 1995). This is especially the case in youth with comorbid conduct problems: the presence of CD is the strongest predictor of also having

a substance use disorder among adolescents with AD/HD (Burke, Loeber, & Lahey, 2001). Thus, it is unclear whether the association between substance use and AD/HD is solely attributable to youth with co-occurring conduct problems. Results have been mixed when comparing youth with “pure” AD/HD to normal adolescents (August, MacDonald, Realmuto, & Skare, 1996; Loeber, Green, Lahey, Frick, & McBurnett, 2000). In addition to conduct problems and substance use, youth with AD/HD may turn to other forms of risky behavior such as sexual risk-taking (Barkley, Fischer, Smallish, & Fletcher, 2006).

High-schoolers with AD/HD are up to three times more likely to drop out of school than their normal counterparts (Weiss & Hechtman, 1993). On average, youth with AD/HD earn significantly lower grades and are more often held back in school (Barkley, 2002; Weiss & Hechtman, 1993). Up to 30% of individuals with AD/HD do not complete high school (Weiss & Hechtman, 1993; Barkley, 1998), and one follow-up study found that only 5% of participants with AD/HD eventually obtained a college degree versus 41% of the comparison group (Weiss & Hechtman, 1993). As in childhood, high rates of depression are also found among adolescents with AD/HD (Spencer, Wilens, & Biederman, 2000; Cuffe, McKeown, Jackson, Addy, Abramson, & Garrison, 2001), particularly among females (Rucklidge & Tannock, 2001). However, this relationship may also be accounted for by the presence of CD (Angold et al., 1999).

The negative, coercive parent-child interaction patterns that may have developed during childhood are typically stable over time and persist into adolescence. Among parents of children with AD/HD, parenting efficacy tends to decline across time (Mash & Johnston, 1983), suggesting a pattern of worsening interactions and decreasing parental

effectiveness throughout adolescence. Mothers of adolescents with AD/HD report high rates of conflict, anger, and negativity in communication with their youth (Barkley, Anastopoulos, Guevremont, & Fletcher, 1992). Parents of children with AD/HD may demonstrate authoritarian or coercive tactics or, alternatively, may become indifferent over time in response to perceived ineffectiveness in their parental roles (Mash and Johnston, 1990; Woodward et al., 1998). Either of these outcomes puts youth at risk for externalizing and internalizing problems (Steinberg & Silk, 2002).

Not surprisingly, parent-child interactions are even more negative when a child with AD/HD has co-occurring aggression, defiance, or conduct problems (Barkley et al., 1992; Barkley, Fischer, et al., 1991; Woodward et al., 1998). As children develop into adolescents, negative and coercive parent-child exchanges may lead to deviant peer relationships. In their social context model of antisocial behavior, Patterson and colleagues (1992) have shown that coercive family patterns that are set in motion during childhood trickle outward into the child's social context throughout development. This leads to child aggression in the school environment, resulting in rejection by prosocial peers and gravitation toward deviant peers by early adolescence. Thus, in adolescence, antisocial behavior is seen as proximally influenced by deviant peers, but these deviant peer affiliations were influenced and maintained by problematic parenting (Patterson, Reid, & Dishion, 1992).

Adolescent Risky Sexual Behavior

In the United States, the adolescent population is particularly vulnerable to risky sexual behavior and disproportionately afflicted with its ramifications. For instance, in 2002, the highest incidence of Chlamydia infection in the United States occurred among the 15- to 19-year-old age group (Department of Health and Human Services, 2003). Furthermore, the U.S. has one of the highest teen pregnancy rates among developed countries (Alan Guttmacher Institute, 1999). Thus, despite the encouraging decline in adolescent pregnancy and sexually transmitted diseases since the 1990's, these sobering statistics highlight adolescent sexual risk-taking as an ongoing public health concern.

There is no widely accepted definition of risky sexual behavior, and many studies focus on teen sexual behavior in general without regard for the level of risk involved (see Rodgers, 1999). Half of high-schoolers nationally report being sexually active (Centers for Disease Control and Prevention, 2001) and over 80 percent of teens have had sexual intercourse by 19 years of age (Alan Guttmacher Institute, 1999). Therefore, it is statistically normative to experience sexual intercourse during the teen years. Several researchers have argued that adolescent sexual risk-taking should be defined in terms of the level of risk involved, as opposed to engagement in sexual activity per se (i.e., Rodgers, 1999; Kotchick, Schaffer, Forehand, & Miller, 2001). Thus, Kotchick and colleagues (2001) define adolescent sexual risk-taking by the following behaviors: “inconsistent or non-use of condoms...or other contraceptive methods, having multiple sexual partners, and use of alcohol or drugs prior to or in conjunction with sexual

activities (pp. 497-498).” Outcomes of sexual risk-taking (pregnancy, STDs) are often studied as indicators of sexual risk-taking.

Hundreds of correlates of adolescent sexual risk-taking have been identified (Kirby, 2002). Some of the demographic risk factors include economic disadvantage, being raised by a single parent, and minority ethnicity (Manlove, 1998; Kotchick et al., 2001). Childhood sexual abuse increases risk for numerous detrimental outcomes, including teenage pregnancy and risky sexual behavior (Tyler, 2002). By adolescence, sexual risk behaviors significantly overlap with other “problem behaviors” or risky behaviors including antisocial behavior, academic failure, and substance use (French & Dishion, 2003; Metzler, Noell, Biglan, Ary, & Smolkowski, 1994). It has been suggested that this overlap is explained by a common underlying factor of psychosocial unconventionality or “deviance-proneness” (Jessor & Jessor, 1977; Donovan & Jessor, 1985; Fortenberry et al., 1997). Other related personality correlates of sexual risk-taking include impulsivity (Breakwell, 1996; Hoyle, Fefjar, & Miller, 2000) and sensation seeking (McCoul & Haslam, 2001; White & Johnson, 1988). Depression has also been linked to sexual risk-taking among adolescents (Kessler et al., 1997).

Parents and peers also influence sexual risk-taking among youth. For instance, parental control appears to be related to adolescent sexual risk-taking in a curvilinear fashion, such that over- or undercontrol are predictive of greater risk-taking, and a moderately high degree of control is ideal (Miller, McCoy, Olson, & Wallace, 1986; Mason, Cauce, Gonzales, & Hiraga, 1996). Coercive family interactions are indirectly associated with risky sex through deviant peer involvement and low parental involvement

(Metzler et al., 1994; Biglan et al., 1990). Poor parental monitoring has consistently been associated with risky sexual behavior as well (Metzler et al., 1994; French & Dishion, 2003). As teenage peers significantly influence each other, it is not surprising that perception of peer sexual risk-taking is also related to youths' own sexual risk-taking (Scaramella et al., 1998).

AD/HD and Risky Sexual Behavior

Given that, as a group, adolescents are particularly vulnerable to sexual risk-taking, and that having AD/HD may compound this risk, *adolescents with AD/HD may be at especially profound risk for experiencing risky sexual behavior and its consequences*. If this is the case, treatment implications for these youth abound. Yet, before treatment methods for adolescents with AD/HD can successfully target sexual risk-taking, questions must be answered about the relationship between AD/HD and sexual behavior.

By adolescence, the child with AD/HD is at risk for failing in school, associating with deviant peers, being poorly attached to parents, and engaging in a variety of risk behaviors (Capaldi, Crosby, & Stoolmiller, 1996; Scaramella, Conger, Simons, & Whitbeck, 1998; Ary, Duncan, Duncan, & Hops, 1999). Additionally, poor relationships and frustration may have created depression in the adolescent, further contributing to risky behavior (Mezzich, Tarter, Giancola, Lu, Kirisci, & Parks, 1997). All of these associated features of AD/HD are related to adolescent sexual risk-taking and its outcomes (Kessler et al., 1997). Thus, not surprisingly, recent research has shown that

individuals with AD/HD may be at increased risk for engaging in risky sexual behavior and suffering from its outcomes, such as pregnancy and sexually transmitted diseases (Barkley et al., 2006; Barkley, 1998; Hansen, Weiss, & Last, 1999). This highlights that for adolescents with AD/HD, a healthy transition to sexual maturity may be especially challenging.

Despite preliminary findings that AD/HD may predispose adolescents to risky sexual outcomes, evidence supporting the relationship is merely suggestive and questions remain. To date, two groups of researchers have specifically reported group differences in sexual risk-taking and/or its outcomes between individuals with and without AD/HD (Barkley et al., 2006; Barkley, 1998; Hansen et al., 1999). Others have examined the relationship using dimensional measures of AD/HD symptoms (Key, 2004) or have personally communicated or suggested a link without published data (see Arnold, 1996). Barkley and colleagues (1998; 2002; 2006) reported that a cohort of primarily male “hyperactive” children followed into young adulthood had initial sexual intercourse at a younger age than controls (15 vs. 16 years old), had been with more sexual partners (19 vs. 7), were less likely to use birth control, were more likely to have conceived a pregnancy (38% vs. 4%), and were more likely to have had a sexually transmitted disease (17% vs. 4%). In a similar longitudinal study, Hansen, Weiss, and Last (1999) found that more boys diagnosed with AD/HD than controls had fathered children by young adulthood. These are the first known studies to raise the possibility that AD/HD may be linked to risky sexual behavior and outcomes. However, the virtual exclusion of females

in these studies prevents generalization to the entire population of adolescents with AD/HD.

Most current knowledge about AD/HD is restricted to Caucasian boys with the Combined Type of the disorder (Barkley, 2002). Relatively less is known about adolescents, adults, and females of all ages with AD/HD, as well as how AD/HD is expressed in different cultural and ethnic backgrounds. The aforementioned studies are no exception: Barkley and colleagues' (1998; 2002; 2006) sample was comprised of 91% males, and Hansen and colleagues (1999) relied on an entirely male sample. Upon separating results for males and females, Barkley and colleagues (2006) found that even with small numbers of females (total n in both groups = 26), hyperactive females were more likely than control females to have experienced a pregnancy by young adulthood. Yet, the majority of the aforementioned results are based primarily on males, and the authors noted that replication with larger numbers of females is warranted (Barkley et al., 2006). Despite the lack of relevant research including females, personal communications from experts suggest that females with AD/HD may be even more vulnerable than males: one researcher observed that girls with AD/HD engaged in intercourse at younger ages than boys with the disorder or peers without the disorder (Conners, 1994). Nadeau and Quinn (2002) have asserted that adolescent females with AD/HD are unlikely to consider the consequences of unprotected sex, because of their impulsiveness and hunger for peer acceptance. To illustrate, a poll of teachers of adolescent students with AD/HD revealed that these teachers observed more "promiscuous" behavior among the girls than among the boys with the disorder (44% in girls versus 28% in boys; Quinn, 2002).

To address the absence of relevant studies on females, a recent study examined relationships among AD/HD symptoms, unintended teen pregnancy, and sexual risk-taking among mostly low-income, African American adolescent females (Key, 2004). Results indicated that females whose parents reported at least 5 out of 9 early childhood inattention symptoms were significantly more likely than girls with fewer childhood symptoms to have experienced a teenage pregnancy. Furthermore, females with high impulsivity levels were also significantly more likely to have been pregnant than those with low impulsivity. Impulsivity was also positively correlated with risky sexual behavior. These results suggest that the relationship between AD/HD symptoms and sexual risk-taking may, in fact, extend to females and ethnic minority groups.

Despite the intriguing findings, several features of the aforementioned studies prevent drawing firm conclusions. The Barkley and Hansen samples were formed before the DSM-IV criteria for AD/HD were available, and Key assessed AD/HD symptoms on a dimensional basis. Thus, it is unclear whether the youth in these studies would have satisfied current DSM-IV criteria for AD/HD. Most studies that have followed children with AD/HD into adolescence and adulthood longitudinally were necessarily forced to rely on children identified with a prior set of diagnostic criteria for AD/HD (either DSM-III or DSM-III-R criteria; Weiss & Hechtman, 1993; Barkley, 1998). Therefore it is not clear how children diagnosed with AD/HD based on DSM-IV criteria fare throughout development, as these criteria have only been in place since 1994. Additionally, the fact that diagnostic criteria were developed primarily based on male children makes it difficult to determine the persistence of AD/HD across development. Persistence may be

obscured due to age-inappropriate criteria for diagnosing adolescents or adults with AD/HD (Barkley et al. 2002; McGough & Barkley, 2004). In fact, a categorical diagnosis of AD/HD may not even be the key factor that increases odds of sexual risk-taking, as Key (2004) found that impulsivity, a core symptom of AD/HD, was correlated with sexual risk-taking on a dimensional basis.

Additionally, comorbidity may account for the reported differences in sexual risk-taking among groups. Studies repeatedly show that many group differences in an AD/HD population may be solely attributable to the subset of the sample that has conduct problems; effects may be moderated or mediated by presence of comorbidity (Loeber et al., 2000; Frick, 1994). In Hansen and colleagues' study, the majority of the males with AD/HD had a co-occurring externalizing disorder (such as Oppositional Defiant Disorder), leading the authors to speculate that these secondary difficulties may have explained the increased rate of early fatherhood among the boys with AD/HD. Barkley and colleagues (2006) found that conduct problems, but *not* hyperactivity, predicted young age of initiation of intercourse in their sample. Thus, perhaps sexual risk-taking is elevated only in the subset of individuals with comorbid difficulties such as conduct problems.

Barkley and colleagues (2006) noted that their AD/HD group would most likely be characterized as having the Combined Type of the disorder. It is unknown whether differences in sexual behavior would be found among those with the other subtypes. Furthermore, the Barkley and Hansen studies were conducted with young adults, and one asked participants to retrospectively report about their adolescent sexual experiences,

calling into question the veracity of reporting about the past and the applicability of these results to adolescents. Finally, the true relationship between AD/HD and sexual risk-taking cannot be illuminated until multiple, interactive factors are assessed simultaneously. When interactions are present but not assessed, examination of group averages may result in null findings. For example, if adolescents with AD/HD only engage in sexual risk-taking when co-occurring conduct problems are present, simple group averages will not reflect this fact. All of the above critiques lead to a conclusion: the premise that sexual risk-taking is elevated among adolescents with AD/HD is not definitively supported to date.

Hypothetical Pathways from AD/HD to Adolescent Risky Sexual Behavior

Although a relationship between AD/HD and risky sexual behavior among adolescents has been suggested, the mechanism for this association is unknown. AD/HD symptoms may lead directly to sexual risk-taking and its outcomes. They may also lead to sexual risk-taking indirectly through creating risk for co-occurring difficulties that are associated with risky sexual behavior. On the other hand, in the presence of protective factors, AD/HD probably does not inevitably lead to sexual risk-taking. These possible pathways are illustrated in Figure 1 and are elaborated below.

Direct Pathways

Of the three core symptoms of AD/HD, impulsivity seems the most theoretically related to sexual risk-taking and has received the most empirical support as a precursor to

risky sexual behavior (Hoyle et al., 2000). Barkley's (1997) influential model of AD/HD provides a perspective on the deficiencies that underlie AD/HD. A simplified version of Barkley's model is depicted in Figure 2. Barkley argues that poor behavioral inhibition is the core deficit of individuals with AD/HD. This deficit in inhibition results in ineffective implementation of executive cognitive functions that facilitate behavioral control, resulting in poor control of behavior and attention. Barkley elaborates that behavioral inhibition is most crucial when one is presented with a conflict between immediate and delayed consequences. In these situations, the "resistance to temptation" or "deferred gratification," which is lacking in people with AD/HD, results in impulsive decision-making based on immediate rewards. Impulsivity is associated with risky behavior in multiple domains (Nagoshi, Wilson, & Rodriguez, 1991; Eysenck & McGurk, 1980). Cooper and colleagues (2000) suggest that "the salient feature of risky behaviors...is that they involve a trade off between short-term...gains and potential long-term costs (p. 1061)." Therefore, impulsivity by definition leads to risk-taking, as impulsive individuals tend to choose courses of action based on immediate gains (Cooper, Agocha, & Sheldon, 2000).

Indeed, impulsivity is one of the most extensively studied personality traits in the sexual risk-taking literature, and it has been consistently, moderately, and positively associated with all forms of sexual risk-taking such as having a greater number of sexual partners and having unprotected and casual sex (Hoyle et al., 2000). The correlations are impressive in adolescent populations: one study found impulsivity to be related to a younger age at initiation of intercourse in females ($r = -.34$) and positively related to

males' number of sexual partners in the past 6 months ($r = .29$; Breakwell, 1996). In a large sample of female adolescents, higher impulsiveness was associated with younger age at initiation of intercourse, having multiple sexual partners, not using contraception and condoms, and having a history of Chlamydia infection (Kahn, Kaplowitz, Goodman, & Emans, 2002).

These relationships are not surprising given the tendency of impulsive individuals to act based on immediate gains (Cooper et al., 2000). Sexual encounters are characterized by the presence of positive immediate and potentially negative delayed consequences. The impulsive individual is likely to act based upon the immediate rewards of sexual activity with relatively little consideration of the possible negative delayed consequences (Cooper et al., 2000). Additionally, lack of reflection and planning before taking action (Cooper et al., 2000) may interfere with implementation of effective protection against pregnancy and sexually transmitted infections. Therefore, an impulsive teen may be unprepared with a condom or other form of birth control during a sexual encounter due to lack of forethought and planning.

In contrast with impulsivity, hyperactivity has received little attention as a factor in sexual risk-taking. The high correlation between hyperactivity and impulsivity symptoms (Bauermeister, Alegria, Bird, Rubio-Stipec, & Canino, 1992; DuPaul, 1991) implies a relationship of hyperactivity to sexual risk-taking, by virtue of the relationship between impulsivity and sexual risk behavior. Additionally, some have argued that the high activity level of children with AD/HD may partially serve a stimulation-seeking function (Zentall & Meyer, 1987; Brimer & Levine, 1983). Sensation seeking, defined as

“the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences (Zuckerman, 1979, p. 10),” has been reported as the most frequently studied personality correlate and is associated with all types of sexual risk behavior (Hoyle et al., 2000). Sensation-seekers are prone to hyperactivity (Ang & Woo, 2003). Therefore findings that sensation seeking is related to both risk-taking and overactivity support the idea that high activity level and sexual risk-taking may be related as well.

Additionally, as hyperactive children develop into adolescents, developmentally relevant hyperactive behaviors may replace the more stereotypical childhood hyperactive behaviors such as climbing or running about (Anastopoulos & Shelton, 2001). It is theoretically plausible that sexual activity is a developmentally pertinent activity that satisfies the high need for activity in hyperactive adolescents. Alternatively, hyperactivity may be spuriously associated with sexual behavior through its relationship to antisocial behavior, impulsivity, or sensation seeking, such that it is unrelated to sexual behavior in the absence of these traits.

The final core symptom of AD/HD, inattention, may theoretically be the least directly related to sexual risk-taking. Inattentive youth are often described as forgetful and disorganized, and they tend to lose materials. Securing birth control requires organization and planning, and some of the required steps (i.e., remembering to take birth control pills or to carry condoms) may tax attention and memory. To the extent that disorganization, forgetfulness, and losing things interfere with performing the necessary tasks to ensure safe sex, inattention may be related to risky sexual activity.

Indirect Pathways

The impact of core AD/HD symptoms may not entirely account for the increased rates of sexual risk-taking in these youth. The difficulties that tend to co-occur with AD/HD during adolescence may increase susceptibility to sexual risk-taking beyond the direct effect of the symptoms themselves. For example, it is possible that the relationship is entirely explained by conduct problems, making an examination of sexual risk-taking in an adolescent AD/HD population of males and females, while attending to comorbidity, especially critical.

The strong link between AD/HD and conduct problems provides evidence for an indirect link between AD/HD and sexual risk-taking. As children with conduct problems develop into adolescents, they are likely to engage in a constellation of problem behaviors including antisocial behavior, substance use, lack of interest and success in school, and sexual risk-taking (Scaramella et al., 1998). Regardless of the reporter or the definition of antisocial behavior (i.e., aggression, number of arrests, CD symptoms), it is consistently associated with early and risky sexual behavior (Capaldi, Crosby, & Stoolmiller, 1996; French & Dishion, 2003; Keenan, Loeber, & Green, 1999). To illustrate, antisocial behavior was the key predictor of early onset of sexual behavior in a longitudinal study of boys (Capaldi et al., 1996). One study found that the presence of Conduct Disorder was the only measured variable associated with inconsistent contraceptive use among female adolescents (Kessler et al., 1997). Externalizing behaviors also longitudinally predict teen pregnancy (Underwood, Kupersmidt, & Coie, 1996; Fagot, Pears, Capaldi, Crosby, & Leve, 1998). Conduct Disorder appears to confer

specific risk for teen pregnancy among females beyond that of any other identified disorder (Kovacs, Krol, & Voti, 1994). The high correlation between antisocial behavior and risky sexual behavior may be explained by a general “risk-taking” disposition (Neumark-Sztainer, Story, French, & Resnick, 1997). Association with deviant peers is also likely a proximal influence (Ary et al., 1999). The fact that the Combined Type of AD/HD appears to be more related to antisocial behavior than the Predominantly Inattentive Type (Murphy, Barkley, & Bush, 2002) indicates that adolescents with problematic impulsivity and/ or hyperactivity may be most vulnerable to this indirect pathway.

AD/HD, substance use, and sexual risk-taking may all be interrelated as well. Alcohol, drug, and tobacco use are significantly associated with risky and early sexual activity and pregnancy (Biglan et al., 1990; Whitbeck, Yoder, Hoyt, & Conger, 1999; Kessler et al., 1997). Youth with AD/HD may be especially prone to smoking cigarettes (Barkley, Fischer, et al., 1991), which is associated with risky sexual behavior on its own (Biglan et al., 1990). Underlying personality dimensions such as poor behavioral control have been implicated in the relationship between sexual risk-taking and substance use (Kalichman, Heckman, & Kelly, 1996). Substance use may be related to sexual risk-taking even more specifically, in that alcohol or drug use immediately prior to a sexual encounter impairs risk perceptions (Norris, Nurius, & Dimeff, 1996), and the resulting reduced inhibition may increase the likelihood of sexual intercourse and decrease the likelihood of taking appropriate precautions (Jemmott & Jemmott, 1993; Strunin & Hingson, 1992).

Academic failure may also be a key factor for youth with AD/HD. Various indices of low academic performance and orientation, such as low grades, dropping out of school, and low expectations of school success, are often antecedents to risky sexual behavior and teen pregnancy (Moore, Peterson, & Furstenberg, 1986; Maynard, 1995). Expectation of going to college is highly predictive of teens' delaying sexual activity and consistently using birth control (Thornberry, Smith, & Howard, 1997), suggesting that adolescents who plan to attend college have greater incentives to prevent outcomes, such as pregnancy, that may hinder their educational attainment (Luster & Small, 1994). To the extent that adolescents are discouraged about their educational prospects, they are at risk for negative sexual outcomes. Thus, a child with AD/HD who experiences academic failure may develop into an adolescent with little hope for attending college or performing successfully in school. As such, there may be less incentive to avoid early pregnancy (Luster & Small, 1994), leading to risky sexual outcomes. The association between academic failure and risky sexual behavior has held independent of the other problem/ risky behaviors (Scaramella et al., 1998), suggesting that even in the absence of conduct problems, an adolescent whose AD/HD symptoms interfere with academic performance and hope for future academic success may be vulnerable to sexual risk behavior.

The discouraged child with AD/HD who is experiencing frustration and lack of success in multiple domains may become depressed. As an adolescent, this depression may lead to sexual risk-taking, perhaps motivated by seeking emotional relief or feeling helpless and incapable of insisting on safe sexual practices (Orr, Celentano, Santelli, &

Burwell, 1994; Cooper et al., 2000). Like the other common co-occurring difficulties, depression has been linked to higher sexual risk-taking and adolescent pregnancy (Kessler et al., 1997; Whitbeck, Hoyt, Miller, & Kao, 1992). This pathway is more implicated for young women, as depressed females may be more prone to sexual risk-taking than depressed males (Whitbeck et al., 1999), and female adolescents with AD/HD have a higher prevalence of depression than males with AD/HD (Rucklidge & Tannock, 2001).

When a child is afflicted with AD/HD, the disruption of functioning to the individual often trickles outward to affect family functioning (Anastopoulos & Shelton, 2001). A poor parent-child relationship and disrupted parenting style confer susceptibility to sexual risk behavior, perhaps through increasing the influence of deviant peers or creating emotional vulnerability (Perrino, Gonzalez-Soldevilla, Pantin, & Szapocnik, 2000; Whitbeck et al., 1992). Lack of positive involvement and self-efficacy may lead parents to withdraw from their parental roles (Johnston & Mash, 2001), contributing to poor monitoring and knowledge of their adolescent's activities (Patterson et al., 1992). A pattern of parental coercion or, alternatively, of withdrawal and lax control, also adds risk for negative sexual outcomes (Miller, McCoy, Olson, & Wallace, 1986). Finally, out of frustration, parents may not communicate sensitively with their adolescents, instead relying on lecturing and negativity (Barkley, Fischer, et al., 1990, 1991). Such communication makes it less likely that a parent will effectively transmit a message about safe sex or pass on parental values about sexual activity (Whitaker, Miller, May, & Levin, 1999).

Research has also found that youths' perception of the sexual behavior of their peers is predictive of engagement in risky sexual behavior (Scaramella et al., 1998; Miller, Benson, & Galbraith, 2000). Adolescents tend to associate with peers who are similar to themselves, and "deviant" youth with externalizing problems and other risk behaviors generally congregate together (Dishion, 1990; Fisher & Bauman, 1988). This proneness to behavior problems among youth with AD/HD, combined with ineffective parenting and coercive family exchanges, may lead them to drift into deviant peer networks characterized by risk-taking in several domains (Patterson et al., 1992). To the extent that adolescents with AD/HD associate with deviant peers and thus believe their peers to be engaging in risky sexual activities, their own sexual behavior may be influenced in kind (Scaramella et al., 1998; Miller et al., 2000).

Summary and Integration of Pathways

In summary, research and theory on the core symptoms and common co-occurring features of AD/HD during adolescence lend plausibility to the contention that having AD/HD can place an adolescent on a trajectory toward sexual risk-taking. Although a relationship between AD/HD and sexual risk-taking is suggested, it is by no means definitively supported to date, especially for females. The mechanisms by which this occurs are also not well understood. The core symptoms of AD/HD (impulsivity, inattention, and hyperactivity) may lead to sexual risk-taking through disrupting decision-making, planning and memory, and ability to delay gratification. Alternatively, the core symptoms may create risk for the co-occurring difficulties of conduct problems,

substance use, academic problems, depression, disrupted parenting style, and deviant peers, all of which have been shown to set the stage for sexual risk-taking.

Despite the distinction between direct versus indirect pathways, the most likely scenario is that all of these pathways are possible, with individual variation as to which pathways are implicated. Figure 1 depicts an integration of the hypothetical pathways from child AD/HD to adolescent sexual risk-taking, and also a pathway toward healthy sexual behavior. Some adolescents with AD/HD may experience elevated risk-taking by way of core symptoms (i.e., impulsivity), while others are at risk through family disruptions. Differences in gender, AD/HD subtype, ethnicity, and other characteristics may predict which developmental trajectory is set in motion. Of course, not all adolescents with AD/HD engage in risky sexual behavior, suggesting that there is a pathway toward healthy development that consists of protective factors that influence the trajectory of AD/HD. Perhaps positive relationships with parents serve as a buffer against development of sexual risk-taking. Treatment for AD/HD symptoms may also act as a protective factor. For example, because core AD/HD symptoms are often reduced by stimulant medications (Greenhill, Halperin, & Abikoff, 1999), perhaps this treatment has the potential to prevent or alleviate negative parent-child interchanges (Cunningham & Barkley, 1979) and academic failure (Gadow, 1983). Hence it may prove valuable in disrupting the developmental trajectories that eventually lead to sexual risk behavior. The proposed pathways are certainly not inclusive of all factors that influence sexual behavior. Further research is warranted to comprehensively outline additional variables that may influence the relationship between AD/HD and sexual risk-taking.

Statement of Purpose and Hypotheses

The goal of the current study was to examine the relationship between adolescent AD/HD and risky sexual behavior. This was done in a manner that addresses limitations of prior research by including a higher proportion of females and ethnic minority youth in the sample, defining AD/HD according to DSM-IV criteria, and simultaneously examining relationships among comorbid symptoms and family factors, AD/HD, and sexual risk-taking. Although childhood sexual abuse is often an important precursor to risky sexual behavior (Tyler, 2002), it was not a focus in the current study because there is no proposed relationship between AD/HD and sexual abuse. Additionally, although peer influences are considered important, measurement of these influences was not within the scope of the current study. The research questions addressed by the study were:

- 1) *Do adolescents with AD/HD, as defined by DSM-IV criteria, report engaging in more risky sexual behavior than their counterparts without the disorder?*
- 2) *Do youth with untreated AD/HD report greater sexual risk-taking than youth with treated AD/HD and those without AD/HD?*
- 3) *Are higher levels of AD/HD symptoms associated with greater risky sexual behavior among adolescents with and without AD/HD?*
- 4) *Do co-occurring features mediate the proposed relationship between AD/HD and sexual risk-taking?*
- 5) *What individual and family factors are associated with greater sexual risk-taking among youth with AD/HD?*

The present study aimed to answer these questions by comparing a group of high-school age adolescents with AD/HD to their unaffected counterparts on dimensions of sexual risk-taking, comorbid symptoms, and family and peer factors. The hypotheses were as follows:

- 1) In a replication of prior research, *it was expected that adolescents with AD/HD would report significantly higher levels of risky sexual behavior than a comparison group without AD/HD.*
- 2) *It was also expected that youth with untreated AD/HD symptoms would report higher levels of risky sexual behavior than both youth with AD/HD currently taking stimulant medication, and youth without the disorder.*
- 3) In an extension of prior research, among the entire sample, *AD/HD symptom severity was expected to be positively related to sexual risk-taking dimensionally. Hyperactive-impulsive symptoms were also expected to be more strongly related than inattention symptoms*, due to the stronger theoretical and empirical support for relationships among impulsivity, hyperactivity, sensation-seeking, and sexual risk-taking. Groups of youth in diagnostic categories are often studied in clinical and psychiatric fields. However, it is also worthwhile to study dimensional relationships between symptoms and outcomes, as is often practiced in developmental research. Examining dimensional relationships was also useful in a recent study on this topic (Key, 2004).
- 4) *It was hypothesized that AD/HD symptoms would explain unique variance in sexual risk-taking above and beyond other known predictors. Known predictors*

*of sexual risk-taking (i.e., conduct problems) were expected to **partially mediate** the relationship between AD/HD and sexual risk-taking, but not entirely account for it.* Rather than simply affecting the strength of the relationship, associated features were expected to partially or entirely *explain* the relationship, representing some of the mechanisms that translate AD/HD symptoms into risky sexual behavior. It is argued that AD/HD symptoms causally precede associated features, which in turn set the stage for sexual risk-taking.

5) *Among youth with AD/HD, female gender, conduct problems, substance use, depression, academic failure, and ineffective parenting style were expected to be associated with greater sexual risk-taking.* Female gender was expected to be more strongly related because of expert speculations that there may be greater sexual acting-out among girls with AD/HD (Conners, 1994; Quinn, 2002).

CHAPTER II

METHOD

Participants

One hundred 15- to 18-year-olds and their caretakers participated. This age range was selected to encompass a wide range of sexual experience, given that nationally about 20% of 15-year-olds have reportedly engaged in sexual intercourse and about 80% have done so by the end of high school (Alan Guttmacher Institute, 1999). To be eligible youth were required to be between the ages of 15 years, 0 months and 18 years, 11 months. Because typical sexual behavior changes as youth move away from parents or enter college, eighteen-year-olds were excluded if they no longer lived with parent(s) *or* had already entered college. The mother or primary female caretaker of each adolescent was also required to participate. Female caretakers participated for all youth with the exception of one father who participated because no female caretaker was available. Female caretakers were primarily selected to lessen systematic variability based on gender of reporters.

Through several recruitment methods (i.e., university AD/HD clinic, local schools, social nomination) approximately 350 youth and/ or their parents were identified as potential participants. Although the researcher attempted to contact and recruit all of these youth or their parents, roughly 250 of them did not participate for various reasons (could not be contacted, declined to participate, did not follow through with

appointments). The remaining 100 youth did participate; thus, the recruitment methods yielded a total sample of 60 females and 40 males. Participant ages ranged from 15 years, 0 months to 18 years, 6 months, with a mean age of 16 years, 9 months. Roughly half (53%) of all participants were Caucasian, 39% were African American, and 8% were from another ethnic background. The participants represented a wide range of socioeconomic status. About 18% of the parents reported annual family incomes below \$15,000, while 27% reported incomes over \$75,000. The remaining 55% reported incomes in categories between \$15,000 and \$75,000. Nine percent of participants' mothers did not finish high school. Fifteen percent reported high school equivalency or diploma as their highest education level. One-third of the parents attended some college. Thirty percent earned either an Associate's or Bachelor's degree, and the remaining 12% attended graduate school.

The intent of recruitment was two-fold: to capture youth with varying levels of AD/HD symptoms (from none to severe), and to recruit enough youth to form extreme groups of adolescents with and without diagnosable AD/HD. This resulted in 3 groups: youth with clearly defined AD/HD, those with symptoms of AD/HD who did not meet full criteria (borderline AD/HD), and those without evidence of AD/HD. Diagnoses were made on the basis of caretaker report, which has been shown to be more valid than adolescent self-report (see Barkley, 1998; Barkley et al., 2002).

Figure 3 depicts the decision-making process used to classify youth into groups. To be included in the "AD/HD" group ($n = 32$), adolescents were required to meet all DSM-IV criteria based on parent report of past and current symptoms and impairment.

Specifically, parents were required to: 1) endorse the frequent occurrence of at least 6 out of 9 of either or both sets of the DSM-IV Inattention or Hyperactivity-Impulsivity symptoms during a structured clinical interview; 2) indicate that symptoms were apparent before the child turned 7 years old and had been present for at least the past 6 months; 3) affirm that the symptoms were currently causing functional impairment in at least two domains of functioning; and 4) endorse a developmentally deviant level of symptoms as evidenced by a T-score of at least 60 (corresponding to the 84th percentile) on subscales of Inattention and/ or Hyperactivity-Impulsivity on a standardized rating scale. This final requirement established that adolescents in this group were, in fact, displaying symptom levels that were developmentally deviant relative to same-age and same-gender peers. One exception was made to the decision process depicted in Figure 3. One participant met all AD/HD criteria during the interview, but slightly fell short of developmental deviance on the BASC-2 rating scale. Yet, because he displayed developmental deviance at the 84th percentile on another rating scale (the ADHD Rating Scale, described below), he was included in the AD/HD group.

The “borderline-AD/HD” group ($n = 28$) consisted of youth who either: 1) met all DSM-IV criteria during the parent interview but did *not* display developmentally deviant levels of symptoms on the rating scale (T-scores <60 / 84th percentile), or 2) did not meet all criteria on the interview but displayed high symptom levels, as indicated by a T-score above 55 ($>70^{\text{th}}$ percentile) on the rating scale. Thus, this group captured youth with features of AD/HD that did not satisfy full diagnostic criteria. Some of the participants in this group likely had other disorders (i.e., depression) that began in adolescence and

caused elevated current symptoms, but did not have early childhood onset of symptoms. Others in this group may have had AD/HD as children but had grown out of many of the symptoms by adolescence.

For the “non-AD/HD” group ($n = 40$), parents were required to: 1) *not* endorse full AD/HD criteria on the parent interview; and 2) report normal levels of Inattention and Hyperactivity-Impulsivity as indicated by T-scores of less than 55 (<70th percentile) on both symptom types on the rating scale.

AD/HD subtype was generally determined based on a match between the subtype indicated during the interview and by the pattern of BASC-2 scores. For example, a participant with high Inattention (6+ symptoms) but low Hyperactivity-Impulsivity (<6 symptoms) during the interview, who had the same pattern of scores on the rating scale, would be classified as having the Predominantly Inattentive Type. In some cases, the AD/HD subtype on the structured interview did not match the pattern of scores on the BASC-2. For instance, many youth technically met criteria for the Predominantly Inattentive Type during the interview, but nevertheless had elevated scores on the Hyperactivity scale on the BASC-2. In these cases, AD/HD subtype was typically assigned on the basis of responses to the structured interview (i.e., Combined Type required 6 or more symptoms of *both* Inattention and Hyperactivity-Impulsivity during the interview, regardless of BASC-2 scores). There were two exceptions, however. In two cases, six or more Hyperactivity-Impulsivity symptoms were endorsed as frequently occurring on the AD/HD Rating Scale (see below), though slightly less than six were

reported during the interview. In these two cases, a Combined Type diagnosis was assigned.

Measures

Measures were selected to obtain information from multiple reporters using varied methods. Parent report is typically considered more valid for AD/HD symptoms (Barkley et al., 2002), while youth report is necessarily required for potentially covert behaviors such as delinquency, substance use, and sexual risk-taking. Therefore, parents reported about youths' AD/HD symptoms (as well as other behaviors), and youth reported about their own behaviors and feelings in other domains. In addition to questionnaires, a parent interview about AD/HD symptoms was added to increase diagnostic accuracy and to compensate for possible drawbacks of relying solely on rating scales (i.e., limited reading proficiency, misunderstanding of questions). A summary of all measures is presented in table 1, listed by reporter, method of completion, and in order of administration.

Diagnostic Measures

Diagnostic Interview Schedule for Children – IV: AD/HD Module (DISC-IV; NIMH, 1997). The DISC-IV is a structured clinical interview designed for administration to parents of youth ages 6-17. Through a series of structured questions, this interview enables clinicians to evaluate DSM-IV criteria for all Axis I disorders of children by systematically determining the presence/ absence, frequency, severity, and onset of symptoms. It has high reliability and validity (see Anastopoulos & Shelton, 2001). The AD/HD module of this interview determines the presence or absence of the 9 Inattention

and 9 Hyperactivity-Impulsivity symptoms listed in the DSM-IV, the age of onset of symptoms, and whether the symptoms cause impairment at home, at school, and in other settings. During a face-to-face interview, the caretaker of each adolescent responded to questions from the AD/HD module of the DISC-IV. Due to practical constraints, this interview was administered in paper-and-pencil format rather than a computerized format. As previously described and depicted in Figure 3, caregiver responses to this portion of the DISC-IV interview and to a questionnaire were used to classify adolescents into AD/HD, non-AD/HD, and borderline-AD/HD groups.

Behavior Assessment System for Children – Second Edition (BASC-2; Reynolds & Kamphaus, 2004). The BASC-II – Parent Rating Scales for Adolescents (BASC-2, PRS-A) is a nationally standardized, normed, and psychometrically sound rating scale for parents of youth ages 12-21. It yields information about several dimensions of adolescent functioning such as externalizing behaviors (i.e., Conduct Problems, Aggression, Hyperactivity), internalizing problems (i.e., Depression, Anxiety), and adaptive functioning (i.e., Social Skills). For each item, the participant circles one of four ratings about frequency of behavior. Computer scoring provides T-scores for each dimension based on age and gender norms. Parents completed the BASC-2 rating scale. In conjunction with results from the DISC-IV interview, T-scores from the Hyperactivity and Attention Problems subscales of the BASC-2 aided in determination of whether AD/HD criteria were met. T-scores from the Conduct Problems subscale was used as an indicator of parent-reported conduct problems. The Depression T-score provided an index of parent-reported adolescent depression.

ADHD Rating Scale-IV (Dupaul, Power, Anastopoulos, & Reid, 1997). The ADHD Rating Scale – IV is a psychometrically sound rating scale of AD/HD symptoms (DuPaul et al., 1997). Like the DISC-IV interview, it contains all 18 AD/HD symptoms listed in the DSM-IV (APA, 1994). Unlike the structured interview, however, the ADHD Rating Scale provides a measure of symptom severity. Symptoms are rated on a 4-point scale of how often the behavior occurs: never or rarely = 0, sometimes = 1, often = 2, very often = 3. The Inattention severity score is a sum of the ratings for all odd-numbered items (inattention symptoms). The severity score ranges from 0 to 27. To calculate the frequency score, each odd-numbered item with a score of “2” or “3” is counted as an endorsed symptom, and the number of endorsed symptoms represents the frequency score. Frequency ranges from 0 to 9 endorsed symptoms. The Hyperactivity-Impulsivity severity and frequency scores are calculated identically with the even-numbered items. Caretakers completed a modified version of the ADHD Rating Scale-IV as a further assessment of adolescents’ level of AD/HD symptomatology. The modification to this scale included ratings of behavior at two different age periods: during early childhood (before age 7) and during the past 6 months. Frequency and severity scores were used as continuous measures of inattention and hyperactivity-impulsivity severity to determine their association with sexual risk-taking in the entire sample, and to determine whether greater symptom severity was associated with greater sexual risk-taking within the AD/HD group.

Primary Outcome Measure of Interest

Scale of Sexual Risk-Taking (SSRT; Metzler, Noell, & Biglan, 1992). The SSRT measures risky sexual behavior in adolescents. This measure consists of 13 self-report items that pose risk for becoming pregnant or acquiring sexually transmitted diseases, and includes questions about use of contraception, number of sexual partners, and sexually transmitted diseases. The scale has displayed good internal consistency (Cronbach's alphas ranging from .75-.91) across several different samples of teenagers from 14-18 years of age. It has been shown to be correlated with a variety of other adolescent risk behaviors that are typically related to sexual risk-taking (see Metzler et al., 1992). Before completing the sexual behavior questionnaire, adolescents were asked whether they had ever had a sexual experience (besides kissing). To minimize exposure to sexual material, sexually inexperienced adolescents (those who answered "no" to this question) did not complete this measure of sexual behavior. Adolescents who were sexually experienced completed a slightly modified version of the SSRT. Questions were added to this measure to assess the age at which an adolescent first engaged in sexual intercourse (if ever), whether pregnancies had occurred, and extent of participation in oral sex. Two final items that were not included in the score asked about youths' perceptions of their peers' level of risky sexual behavior. The scoring of this measure is described in the Results section.

Measures of Demographics and Associated Features

Family Information Questionnaire. Caregivers completed a brief questionnaire assessing child ethnicity, family income, caregiver's education level, and marital status. The questionnaire also included questions about youth's diagnostic and treatment status (whether AD/HD had ever been diagnosed, whether the youth had participated in counseling/ treatment), medication status, and academic functioning (grades in school).

Elliott and Ageton's (1980) Self-Report Delinquency (SRD) Scale. The SRD is a 40-item delinquency questionnaire that was used in the National Survey of Youth and includes a wide range of delinquent activities, ranging from minor delinquency (i.e., not returning extra change given by a cashier) to serious delinquent acts (i.e., assault). Youth are asked to indicate (by circling) how many times they have participated in each activity during the last year. Frequency response options are: 0 times, 1-2 times, 3-5 times, 6-10 times, over 10 times. This measure has demonstrated good psychometric properties (Elliott & Ageton, 1980). Youth completed a modified version of the SRD. To decrease length, the questionnaire was shortened to 28 items for the current study by consolidating some items that refer to similar behaviors (i.e., destroying school property, destroying home property). As suggested by the creators (Elliott & Ageton, 1980), to score this measure frequency scores for each item were transformed into standard scores (to prevent serious items with low frequencies from contributing less to the overall score). Item standard scores were summed to yield a total delinquency score. Therefore, youth with a few instances of high-frequency, minor delinquency would appropriately have a lower score than youth with a few instances of low-frequency, serious delinquency.

SRD Substance Use Subscale. An additional subscale from the Self Report Delinquency measure includes 7 items that assess alcohol and drug use. Youth are asked to mark the number of times they have used each type of substance in the last year, with the same response options as the SRD. To report on their substance use over the past year, youth completed the substance use items at the end of the SRD questionnaire (on the same questionnaire form). One item was added to assess ecstasy use (this modern drug was not assessed on the original SRD measure). An item was also added to measure extent/ severity of alcohol use (largest number of drinks in one day).

Beck Depression Inventory – Second Edition (BDI-II; Beck, Steer, & Brown, 1996). This widely used, psychometrically sound self-report inventory includes 21 items that correspond to depression symptoms, rated on a 4-point severity scale (0-3). This questionnaire was originally designed for use with adults, but has been effectively used with adolescents and found to display high internal consistency (i.e., .92) in this age group (Steer, Kumar, Ranieri, & Beck, 1998). Furthermore, though it was intended for adults, it was expected to be a more appropriate measure for 15-18-year-olds than rating scales designed primarily for children. It is scored by summing ratings for all items. One item that refers to decreased sexual interest was omitted as it may not be applicable to many adolescents.

Children's Report of Parental Behavior Inventory-108 (CRPBI; Schludermann & Schludermann, 1970). The CRPBI (Schaefer, 1965) is a questionnaire that captures adolescents' perceptions of 3 parenting style dimensions: acceptance/ rejection, autonomy/ psychological control, and firm/ lax control. The 108-item version

(Schludermann & Schludermann, 1970) was used in the current study. It has been successfully used with children, adolescents, and college students, and demonstrates good psychometric properties (Kawash & Clewes, 1988). Scores on the 3 parenting style scales served as indicators of parenting style. Although the scale can be used to derive further sub-dimensions of parenting style, they were not used in the current study.

Vocabulary Subtest. The Vocabulary subtest of the Wechsler intelligence scales (WISC-IV and WAIS-III; Wechsler, 1997; Psychological Corporation, 2003) is highly correlated with overall intelligence and is the most reliable subtest (Sattler & Dumont, 2004; Sattler, 2001). The task is administered by asking individuals to orally define a specific set of increasingly difficult vocabulary words. Responses are scored according to standardized criteria and compared to age norms, resulting in a standard score ranging from 1-19 (mean = 10; standard deviation = 3). Because the Vocabulary subtest is most highly correlated with Full Scale IQ and Verbal IQ, a score from this subtest provides a rough estimate of verbal intellectual functioning. The subtest standard score was used to determine whether AD/HD, non-AD/HD, and borderline-AD/HD groups differed in estimated verbal intelligence. Different versions of the task were administered based on the age of the participant (according to guidelines of the tests). Participants under age 17 took the subtest from the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Psychological Corporation, 2003); participants aged 17 years or older took the subtest from the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, 1997).

Procedure

Adolescents in the AD/HD group were recruited from both clinical and community sites. Most youth were recruited from the university AD/HD Specialty Clinic (9%), through flyers posted at a local medical practice (7%), and from social nominations by which participants nominated friends to be contacted about participating in the study (76%). The remaining 8% was recruited either through being a relative of a client at the AD/HD specialty clinic, through the university general psychology clinic, through a local private school, and through an announcement at a local Parent Teacher Association meeting. Referral source varied across groups. Eight members of the AD/HD group (25%) were recruited through the AD/HD clinic, 17 (53%) were recruited through social nominations, and the remaining 7 (22%) were recruited through other methods. The majority of the non-AD/HD and borderline-AD/HD groups (88% and 86%, respectively) were recruited through social nominations.

Recruitment methods included asking clients of the appropriate age attending the university AD/HD and general psychology clinics to participate, posting flyers/ sending letters at a local medical practice and a private school, and announcing the project at a local PTA meeting. The majority (76%) of recruitment involved a social nomination process whereby the researcher contacted participants' friends that they nominated to hear about the study. In most cases, the researcher contacted the potential youth participant and described the project to the teenager first (by phone or in person) and then the parent. Occasionally first contact was made through the parent. In fewer cases the participant or parent called the researcher after seeing a flyer to inquire about the project.

All recruitment and participant visits were conducted by the same Caucasian female graduate student. Therefore, because the same researcher conducted the parent and youth portions, she was often aware of the likely group classification of the youth participants (determined through the parent interview) during the youths' participation.

The researcher fully explained the project to both adolescents and parent(s) over the phone. Typically, the researcher described the project first to the adolescent to assess interest, then to the parent(s) if the adolescent expressed interest. If youth and parents agreed to participate, an appointment was scheduled. The appointment was conducted at the participant's home or at the university clinic, according to the participant's preference. Most participation took place at the families' homes.

The researcher met the family at the desired location. The researcher described the project again, answered questions, and obtained written consent and assent. Prior to completing questionnaires, adolescents were informed of the limits of confidentiality in verbal and written form. All participants were explicitly informed of the option of refusing to answer any or all items. After the consent process, the researcher explained instructions for the first questionnaire (CRPBI) to the adolescent and sent the youth to work on the questionnaire in private while the researcher talked with the parent. The researcher then administered the structured interview to the parent, after which the parent was asked to complete questionnaires on her own in a separate location. Privacy was emphasized and in homes where privacy was difficult to ensure, the researcher invited the adolescent to complete participation outside (porch or backyard). Youth then completed their remaining portion of participation with the researcher.

After completing the first questionnaire, the youth was administered the vocabulary subtest. Then youth completed the remaining questionnaires in the following order: BDI-II, SRD, SSRT. Therefore the researcher was well acquainted with the youth before more intrusive questions about sex were asked. The researcher gave the questionnaires to the adolescents one-by-one, explained instructions for each questionnaire, and clarified items as needed. Several youth endorsed an item reflecting suicidal ideation from the BDI-II. In such cases the researcher followed up with youth to ensure safety. Most youth denied intent or plans to harm themselves but nevertheless were encouraged to seek counseling. In one case the researcher consulted with a parent (with the youth's permission) and made a referral to the university clinic. No youth disclosed physical or sexual abuse.

After completing the questionnaires youth nominated friends to be contacted about participating. The youth was then compensated with a choice of \$10 gift card to one of several local businesses of interest to teenagers (such as movie theaters). All participants were also given a guide of local resources for AD/HD assessment and treatment, counseling, and teen pregnancy prevention.

CHAPTER III

RESULTS

Scoring and Internal Consistency

In accordance with the original authors of the Scale of Sexual Risk-taking (SSRT; Metzler et al., 1992), this questionnaire was scored by calculating standard scores (z -scores) for each item, and then computing a weighted average of the z -scores for each participant by unit-weighting some items and double-weighting others. Double-weighted items included those that pose greatest risk for sexually transmitted diseases, such as having intercourse with a greater number of partners or with high-risk partners (non-monogamous partners and IV drug users) and non-use of condoms. Items that were not double-weighted involved slightly less risk for STDs such as non-use of birth control and substance use immediately preceding sexual activity. The only modification to the original proposed scoring included the addition of an item about prior pregnancy experience to the scale (yes or no), which was double-weighted as a high-risk item and added into the score. Prior studies with this measure obtained Cronbach's alphas ranging from .75-.91 (see Metzler et al., 1992). The current sample yielded a Cronbach's alpha of .89 (based on 15 items), suggesting excellent internal consistency in this sample.

Other measures also displayed excellent internal consistency. For example, the AD/HD Rating Scale displayed a Cronbach's alpha of .98 (based on 36 items). The Cronbach's alpha for the Self Report Delinquency scale was .89 (based on 28 items).

Preliminary Analyses

Means and standard deviations of all parent and youth reported variables are presented in table 2. Examination of descriptive statistics and histograms of the main variables revealed that several of the variables, including the dependent variable (Scale of Sexual Risk-Taking score), were highly positively skewed. Most of the skewed variables involved behaviors that many teens have never engaged in whatsoever (i.e., sexual activity, substance use, delinquency), which produced a significant gathering of responses at the low end of the distribution. Several variables also had very high kurtosis values, indicating leptokurtic (peaked) distributions. It was determined that skewness and kurtosis values of 1.5 or greater represented problematic departure from normality that violated the assumption of the parametric tests used for analyses (see Lomax, 2001). A total of six variables had skewness and/ or kurtosis values greater than 1.5 and were transformed with a square root transformation (after they were first transformed to make all values positive). In all but one case skewness and kurtosis were reduced to below 1.5. The BASC-2 Conduct Problems variable continued to have extremely high kurtosis even after transformation. The transformed scores for these six variables were used for all analyses.

Group Comparability

Table 3 provides a summary of demographic characteristics for the overall sample and for each group. Chi-square tests and Analyses of Variance (ANOVAs) were conducted to examine the comparability of groups on age, demographics, and estimated

verbal intelligence. The groups were statistically equivalent (all p values $> .05$) with respect to age, $F(2, 97) = 2.22$; gender, $\chi^2(2, N = 100) = 2.86$; ethnicity, $\chi^2(6, N = 100) = 2.44$; family income, $\chi^2(10, N = 100) = 6.86$; parent's education level, $\chi^2(12, N = 99) = 11.19$; and parents' marital status, $\chi^2(2, N = 100) = 2.23$. Vocabulary subtest scores among the AD/HD group ($m = 9.88$), non-AD/HD group ($m = 10.72$), and borderline-AD/HD group ($m = 9.59$), were also not significantly different from each other, $F(2, 95) = 1.24$, $p = .29$. Thus, the three groups were statistically equivalent with respect to these demographic characteristics and estimated verbal intelligence.

Group Comparisons

Figure 4 depicts the transformed mean SSRT score for each group. Higher scores represent higher levels of sexual risk-taking. Although the AD/HD and borderline-AD/HD groups reported higher sexual risk-taking than the non-AD/HD group, these group differences did not reach statistical significance, $F(2, 97) = 2.09$, $p = .13$.

To assess the potential impact of medication status, the AD/HD group was divided into those that were being treated with medication ($n = 9$) versus those who were not ($n = 23$). Figure 5 depicts results from an ANOVA with four groups: untreated AD/HD, treated AD/HD, borderline-AD/HD group, and non-AD/HD group. This ANOVA revealed significant group differences, $F(3, 96) = 5.04$, $p = .003$. Thus, group differences in sexual risk-taking only reached significance when treatment status was taken into account. Post hoc tests using Tukey's Honestly Significant Difference (HSD) method indicated that the untreated AD/HD group reported higher sexual risk-taking than

both the treated AD/HD group ($p = .009$) and the non-AD/HD group ($p = .01$), whereas the borderline-AD/HD group did not significantly differ from any of the other groups. Although the treated AD/HD group reported the lowest level of sexual risk-taking, it was not significantly lower than the borderline- or non-AD/HD groups.

Table 4 shows the group means for conduct problems, depression, academic performance, substance use, and parenting style variables. Two separate one-way Multivariate Analyses of Variances (MANOVAs) were used to determine group differences in these variables. The first MANOVA indicated significant group differences in common co-occurring difficulties of AD/HD: self-reported and parent-reported conduct problems, grades in school, and self- and parent-reported depression, Wilks' Λ (12, 1, 95) = .60, $p < .001$. Follow-up ANOVAs revealed group differences in self-reported delinquency, $F(2, 93) = 5.37$, $p = .006$ and depression, $F(2, 93) = 5.39$, $p = .006$. However, the three groups did not differ significantly with respect to self-reported substance use, $F(2, 93) = .32$, $p = .73$. Using parent-report variables, group differences emerged with regard to conduct problems, $F(2, 93) = 11.12$, $p < .001$, depression, $F(2, 93) = 5.33$, $p = .006$, and grades in school, $F(2, 93) = 9.46$, $p < .001$. Post hoc Tukey's HSD tests revealed that regarding self-reported difficulties, the borderline-AD/HD group endorsed significantly greater delinquency and depression than the non-AD/HD group ($p = .009$ and $p = .01$, respectively). However, using parent-report measures, the AD/HD group was rated as having greater conduct problems than both the borderline-AD/HD group ($p = .03$) and the non-AD/HD group ($p < .001$), and greater depression than the

non-AD/HD group ($p = .01$). Finally, youth in the AD/HD and borderline-AD/HD groups both earned lower grades than non-AD/HD youth ($p < .001$ and $p = .04$, respectively).

A second MANOVA indicated that the three composite scores of parenting style did not differ significantly across groups, $\lambda(6, 1, 97) = .88, p = .07$, though there was a nonsignificant trend for the youth in the AD/HD and borderline-AD/HD groups to characterize their parents as less accepting and more controlling than the non-AD/HD group.

Correlations among Predictor and Outcome Variables

Correlations among all demographic characteristics, predictor variables, and sexual risk-taking are presented in table 5. Of primary interest are correlates of sexual risk-taking and AD/HD symptoms. Self-reported delinquency was the variable most highly, positively correlated with sexual risk-taking (see table for values). Consistent with prior literature, other notable correlates of greater sexual risk-taking included having an unmarried primary caregiver, minority ethnic background, lower family income and education, lower grades in school, greater substance use, greater depression, and greater perceived peer sexual risk-taking. Furthermore, lower parental acceptance and greater parental psychological control were also associated with greater sexual risk-taking. Regarding AD/HD symptoms, greater numbers of current Inattention and Hyperactivity-Impulsivity symptoms were associated with significantly higher sexual risk-taking, yet childhood AD/HD symptoms were uncorrelated with sexual risk-taking. Furthermore, greater current AD/HD symptoms were significantly related to higher delinquency and

conduct problems, substance use, and depression, and to lower grades in school. Higher AD/HD symptoms were related to characterization of parents as more psychologically controlling.

Other correlations of interest emerged with regard to gender and parenting style. Consistent with past findings, females were rated as having lower childhood AD/HD symptoms and lower current Hyperactive-Impulsive symptoms than males. Females also reported greater depression than males. However, gender was not associated with delinquency levels. Females characterized their parents as less accepting and more psychologically controlling than males. Regarding correlates of parenting style, greater youth delinquency and depression were most highly associated with less accepting and more psychologically controlling parenting style. Consistent with prior literature, all risky behaviors were positively correlated with each other.

AD/HD Symptoms as Predictors of Risky Sexual Behavior

Preliminary Analysis: Demographics

A preliminary stepwise multiple linear regression was conducted to determine which demographic characteristics emerged as significant predictors of risky sexual behavior, to enable them to be controlled in subsequent regressions. Table 6 provides standardized and unstandardized betas for the regression analysis conducted to predict the sexual risk-taking score (with square root transformation) with all demographics as predictors: child age, gender, ethnicity, parent's income, parent's marital status (coded as 1 = married, 2 = unmarried), and parent's education level. Having an unmarried primary

caregiver emerged as the only statistically significant predictor of greater sexual risk-taking, $\beta = .41$, $p < .001$. This variable was therefore entered initially as a covariate in subsequent regressions to control for its association with sexual risk-taking.

Preliminary Analysis: AD/HD Symptoms

The next analysis involved a stepwise, hierarchical multiple linear regression to determine the extent to which various measures of AD/HD symptoms predicted youth sexual risk-taking. This step determined the most powerful AD/HD variable(s) to retain in the main analysis to prevent entering too many variables, which could lead to low power and chance findings. Table 7 presents the coefficients of this regression. Parent marital status was entered as a first step. The second step included current inattention and hyperactivity-impulsivity frequency (from the ADHD Rating Scale) and current number of Inattention and Hyperactivity-Impulsivity symptoms (from the structured interview). After parent marital status was controlled, greater number of current hyperactivity-impulsivity symptoms (from the interview) emerged as the only other significant predictor of higher sexual risk-taking. Thus, this variable was selected for use in subsequent regression analyses as it was the most predictive of sexual risk-taking. Together with parent marital status, number of hyperactive-impulsive symptoms accounted for 20 percent of the variance in sexual risk-taking (adjusted R^2).

Primary Analysis

To determine whether AD/HD was a significant predictor of risky sexual behavior above and beyond other known predictors, the next hierarchical stepwise regression involved four steps: parent marital status entered first; all other variables of previously studied predictors of risky sexual behavior (those shown in table 4) entered next; hyperactivity-impulsivity symptoms entered third; and medication status entered last to determine impact of treatment. Table 8 shows the outcome of this regression. In the first step, parent marital status accounted for 16 percent of the variance in sexual risk-taking, with adolescents of single parents reporting higher rates of sexual risk-taking than those living with a married parent. The second step, involving previously-studied correlates, revealed that greater self-reported delinquency was the only significant predictor of sexual risk-taking, accounting for an additional 25% of the variance. In the third step, greater number of Hyperactivity-Impulsivity symptoms remained a significant predictor of sexual risk-taking. It accounted for an additional 3 percent of the variance, after parent marital status and self-reported delinquency were controlled.

Medication status (on vs. off AD/HD medication) was entered as a predictor of sexual risk-taking in the final step. Taking medication for AD/HD symptoms was significantly predictive of lower sexual risk-taking, $\beta = .18$, $p = .03$, and it accounted for an additional 2 percent of the variance in sexual risk-taking above and beyond the other predictors. In the final model, the following variables remained significant predictors and together accounted for 46 percent of the variance in sexual risk-taking: parent marital status, delinquency, current hyperactivity-impulsivity, and medication status.

Mediation of the Relationship between AD/HD Symptoms and Risky Sexual Behavior

Because of their association in prior research with both AD/HD and risky sexual behavior, the following seven variables were tested as possible mediators of the relationship between AD/HD symptoms and risky sexual behavior: delinquency (conduct problems), academic performance (grades), substance use, depression, and three parenting style variables (Acceptance/ Rejection, Psychological Control/ Autonomy, and Firm/ Lax Control). These variables were separately tested as mediators of the relationship between inattention and sexual risk-taking as well as hyperactivity-impulsivity and sexual risk-taking. In accordance with the Baron and Kenny (1986) method, tests of mediation were conducted with a series of multiple linear regressions. This method involved conducting three regressions to test each potential mediator:

- 1) Predicting the mediator (i.e, conduct problems, substance use) with the independent variable (inattention symptoms, hyperactivity-impulsivity symptoms).
- 2) Predicting the dependent variable (sexual risk-taking) with the independent variable (inattention symptoms, hyperactivity-impulsivity symptoms).
- 3) Predicting the dependent variable (sexual risk-taking) with *both* the independent variable (inattention symptoms, hyperactivity-impulsivity symptoms) and the mediator (i.e., conduct problems).

For full or partial mediation to be supported, all of the following outcomes must result from the regressions:

- 1) The independent variable (inattention or hyperactive-impulsive symptoms) must affect the mediator (i.e., conduct problems).
- 2) The independent variable (inattention or hyperactive-impulsive symptoms) must affect the dependent variable (sexual risk-taking).
- 3) The mediator (i.e., conduct problems) must affect the dependent variable (sexual risk-taking) *and* the effect of the independent variable on the dependent variable must be less (or none) when the mediator is controlled (Baron & Kenny, 1986, p. 1177).

Inattention

Inattention did not emerge as a significant predictor of sexual risk-taking in the aforementioned regression when parent marital status and hyperactivity-impulsivity symptoms were also entered. However, it was positively correlated with sexual risk-taking by itself ($r = .20$). Therefore it was included in mediation tests despite its lack of significance in the previous regression analysis.

The first set of tests was to determine possible mediators of the relationship between inattention symptoms and risky sexual behavior. The first regressions involved predicting each mediator with number of current inattention symptoms. Inattention symptoms significantly predicted four of the proposed mediators: delinquency, grades, depression (BASC-2 Depression score), and Psychological Control/ Autonomy (parenting style variable).

The second regression involved predicting risky sexual behavior (SSRT score) with inattention symptoms. Despite that inattention symptoms previously did not predict sexual risk-taking when parent marital status and hyperactivity-impulsivity were also included, they did, in fact, significantly predict sexual risk-taking when entered on their own, $\beta = .20$, $p = .05$. The variance accounted for was small, with an adjusted R^2 of .03 and r of .20 ($p = .03$). Next, the four third-step regressions were conducted to determine whether the proposed mediators were associated with sexual risk-taking, and whether the impact of inattention on sexual risk-taking decreased or disappeared once the mediators were controlled. When these final regressions were conducted with depression and psychological control/ autonomy (parenting style), these proposed mediators did not significantly predict sexual risk-taking. Therefore mediation was not supported with these two variables.

However, mediation was supported for the other two variables: delinquency and grades in school. Figure 6 provides a graphical display of the mediation for each variable. The bivariate correlation between Inattention symptoms and risky sexual behavior was .20 before the mediators were entered. The graphs show the reduced correlation of Inattention and risky sexual behavior when the mediator is also entered. As can be seen in the figure, in both cases Inattention became virtually uncorrelated with sexual risk-taking after the mediator was entered, while the mediator was significantly correlated with sexual risk-taking. These findings suggest that both delinquency and academic performance fully mediate the relationship between Inattention and sexual risk-taking. That is, greater inattention symptoms are significantly associated with greater sexual risk-

taking only because this relationship is mediated by lower grades and/ or greater delinquency. The regression coefficients for these two significant mediation tests are presented in table 9.

Hyperactivity-Impulsivity

The same seven variables were also tested as potential mediators of the relationship between hyperactivity-impulsivity and risky sexual behavior. The first set of regressions revealed that current hyperactivity-impulsivity symptoms significantly predicted four of the seven variables: Grades in school, depression (BASC-2), Psychological Control/ Autonomy, and Firm/ Lax Control. The second regression also revealed that current hyperactivity-impulsivity symptoms significantly predicted sexual risk-taking, $\beta = .24$, $p = .02$, to a greater degree than inattention symptoms (adjusted $R^2 = .05$; $r = .24$, $p = <.001$). The third-step set of regressions indicated that depression, Psychological Control/ Autonomy, and Firm/ Lax Control were not significant predictors of sexual risk-taking, and were therefore not supported as mediators. However, as was the case for inattention, grades in school emerged as a mediator of the relationship between hyperactivity-impulsivity and sexual risk-taking. Figure 7 shows a graph of the mediation and table 10 presents the regression coefficients. The initial bivariate correlation between sexual risk-taking and hyperactivity-impulsivity symptoms was .24. After grades in school were also entered, this correlation was reduced to nonsignificance, though a small positive correlation remained ($r = .14$).

Correlates of Risky Sexual Behavior within the AD/HD Group

Gender Differences

There were 16 males and 16 females in the AD/HD group. A t-test indicated no significant gender difference in sexual risk-taking within this group, $t(30) = -1.24, p = .23$. However, a MANOVA revealed a significant gender difference with respect to conduct problems, depression, grades, and substance use, $\Lambda(6, 1, 24) = .58, p = .03$. Follow-up ANOVAS indicated that the only significant gender difference was in self-reported depression, $F(1, 29) = 8.08, p = .01$, with females in the AD/HD group reporting greater depression than males with AD/HD. A second MANOVA also revealed gender differences within the AD/HD group in parenting style variables, $\Lambda(3, 1, 28) = .75, p = .05$. Follow-up ANOVAs indicated the difference was primarily in the variable of Psychological Control/ Autonomy, $F(1, 30) = 7.60, p = .01$, whereby females with AD/HD rated their parents as significantly more psychologically controlling than males. However, Psychological Control/ Autonomy was not correlated with sexual risk-taking among these females, $r(16) = .02, p = .95$. Rather, it showed a trend toward positive correlation with depression (though to a non-significant degree, likely due to low power), $r(16) = .30, p = .27$. Thus, females in the AD/HD group were more likely than males to report greater depression and to rate their parents as more psychologically controlling and less granting of autonomy. However, these females did not report greater sexual risk-taking than the males.

Parent Marital Status

Having an unmarried primary caregiver was significantly associated with increased sexual risk-taking in the entire sample. Within the AD/HD group, the participating parent was married in 18 cases, whereas the parent was unmarried in 14 cases. The youth in the AD/HD group with unmarried parents reported significantly greater sexual risk-taking than youth with a parent who was married, $t(30) = -4.83, p < .001$. This difference appeared slightly more pronounced than the difference between married vs. unmarried parents in the other two groups, $t(66) = -2.17, p = .03$, suggesting that the AD/HD group may be especially vulnerable to this risk factor. Therefore, an ANOVA was conducted with the entire sample to assess for a possible interaction between parent marital status and AD/HD diagnosis. As shown in figure 8, there was a significant interaction between parent marital status and AD/HD diagnosis, whereby youth with a single parent *and* AD/HD reported the highest level of sexual risk-taking, $F(2, 94) = .4.06, p = .02$. As can be seen in the figure, youth in the AD/HD group whose primary caregiver was married reported similar levels of risk-taking to those in the other groups with married parents. Yet, among youth with unmarried parents, youth in the AD/HD group reported extremely high levels of sexual risk-taking compared with the other groups. This indicates that having a single parent moderates the relationship between AD/HD and sexual risk-taking.

Subtype Differences

Within the AD/HD group, 14 youth were classified as having the Combined Type of the disorder, 16 were classified with the Predominantly Inattentive Type, and 2 were classified with the Predominantly Hyperactive-Impulsive Type. An ANOVA revealed no significant differences among youth with these subtypes in sexual risk-taking, $F(2, 29) = .049, p = .952$. MANOVAs also suggested no significant subtype differences in the other main co-occurring variables of interest, $\Lambda(12, 2, 46) = .46, p = .07$, or in parenting style variables, $\Lambda(2, 1, 29) = .93, p = .91$.

Medication Status

As can be seen in figure 5, youth with AD/HD who were taking medication reported significantly lower sexual risk-taking than those not taking medication, $t(28.8) = -4.39, p < .001$ (equal variances not assumed). A MANOVA also demonstrated differences by medication status on the other main co-occurring features (depression, conduct problems, grades, substance use), Wilks' $\Lambda(1, 1, 29) = .41, p = .001$. Follow-up ANOVAs revealed that youth with AD/HD who were not taking medication had higher self-reported delinquency, $F(1, 29) = 14.17, p = .001$; parent-reported conduct problems, $F(1, 29) = 7.19, p = .01$; substance use, $F(1, 29) = 4.23, p = .01$; and self-reported depression, $F(1, 29) = 19.32, p < .001$. Figure 9 shows the mean differences in depression, delinquency, and substance use among unmedicated and medicated youth. Within the AD/HD group, youth who were taking medication and those who were not did not differ significantly on current inattention symptoms, $t(30) = 1.17, p = .25$, or

hyperactivity-impulsivity symptoms, $t(30) = 1.17, p = .25$. However, this may be an artifact of study instructions given to parents to rate youth behavior according to when they were *unmedicated*.

Youth were classified as to whether their delinquency scores were above or below the median (of the entire sample). A chi-square analysis revealed that medicated youth with AD/HD were much less likely to have delinquency scores above the median than those not taking medication, $\chi^2(1, N = 32) = 8.88, p = .003$. In fact, only one out of the nine medicated youth had above-median delinquency, whereas 16 out of 23 unmedicated youth had above-median delinquency.

Conduct Problems

Because conduct problems were identified as a mediator of the relationship between inattention and sexual risk-taking, it was expected that conduct problems would represent a significant correlate of sexual risk-taking within the AD/HD group. When youth within the AD/HD group were divided according to whether their self-reported delinquency scores were above or below the entire sample's median, 15 youth had below-median scores and 17 youth had above-median scores. As depicted in figure 10, youth with high (above-median) delinquency reported significantly greater sexual risk-taking than youth with below-median delinquency, $t(30) = -2.88, p = .01$. In fact, youth in the AD/HD group with below-median delinquency actually reported slightly lower mean levels of sexual risk-taking than the non-AD/HD group. This suggests that in the absence of conduct problems, levels of risky sexual behavior among youth with AD/HD may be

similar to those without AD/HD. However, youth with AD/HD *and* higher levels of delinquency appear to be at particular risk for high sexual risk-taking. This suggests delinquency could be a moderator of the relationship between AD/HD and sexual risk-taking. However, although there was a trend for an interaction between AD/HD diagnosis and delinquency level (above vs. below median) affecting sexual risk-taking, it did not reach significance, $F(2, 94) = 2.58, p = .08$.

Figure 11 illustrates that the sexual risk-taking difference between medicated and unmedicated youth is much more pronounced when examining delinquency classifications as well. Youth with above-median delinquency scores who were also unmedicated ($n = 16$) reported extremely high levels of sexual risk-taking, versus youth who were either medicated and/ or who reported below-median delinquency. In fact, it appears from the graph that high delinquency is only associated with greater sexual risk-taking among unmedicated youth. However, possibly because of low power, this interaction was not significant, $F(1, 28) = .645, p = .43$. Delinquency and substance use were also highly correlated within the AD/HD group, $r(32) = .68, p < .001$, whereas these two variables were moderately correlated in the other two groups, $r(68) = .39, p = .001$. Thus, it appears that among youth with AD/HD, conduct problems may be associated with other forms of risk-taking to an especially high degree. Conduct problems appear to be an even greater risk factor when a teen also has AD/HD.

Substance Use

In the overall sample, greater substance use was associated with greater sexual risk-taking to a moderate degree, $r(100) = .36, p < .001$. However, within the AD/HD group, this association was more pronounced, $r(32) = .73, p < .001$. This suggests that the link between substance use and risky sexual behavior may be stronger for youth with AD/HD. Youth in the entire sample were classified into groups of below average versus above average substance use. As illustrated in figure 12, there was a significant interaction between substance use (low vs. high) and AD/HD diagnostic status, $F(2, 94) = 7.37, p = .001$. Youth with both AD/HD *and* above average substance use reported the highest levels of sexual risk-taking. By contrast, youth in the non-AD/HD group reported similar levels of sexual risk-taking regardless of substance use level. Thus, substance use emerged as a moderator of the relationship between AD/HD and risky sexual behavior. AD/HD *plus* a high level of substance use appears to be a particularly risky combination.

CHAPTER IV

DISCUSSION

Among the childhood psychological disorders, AD/HD has received copious research attention. Yet, how this disorder unfolds during the challenging period of adolescence has not been fully explored. In addition to struggling with core symptoms of AD/HD, adolescents with the disorder experience difficulty in domains such as academics, family and social relationships, and decision-making (see Barkley, 1998). During this period they may also struggle in an unfamiliar domain: sexual development. Although some research has shown that AD/HD may be a factor affecting sexual behavior (Barkley, 1998; Barkley et al., 2006; Hansen et al., 1999; Key, 2004), the sexual development of adolescents with AD/HD is not well understood. In addition to the scarcity of studies on this matter, methodological issues have prevented obtaining definitive answers regarding the relationship. For example, no known prior studies on this topic have employed full DSM-IV criteria to diagnose AD/HD. Most studies have included primarily Caucasian boys with the Combined subtype of the disorder. Perhaps most critically, the impact of comorbidity on the relationship between AD/HD and risky sexual behavior has largely been neglected to date. Thus, although there is preliminary evidence for the relationship, possible pathways and mechanisms from childhood AD/HD to adolescent sexual risk-taking remain speculative.

This study addressed these gaps in knowledge by including both male and female adolescents of varied ethnic backgrounds. AD/HD diagnostic status was determined using full DSM-IV criteria. Additionally, associated features of AD/HD were assessed to allow for examination of multiple interactive factors and their relationship to sexual risk-taking.

Analysis of Findings

Hypotheses

The first hypothesis proposed that *adolescents with AD/HD would report significantly higher levels of risky sexual behavior than a comparison group without AD/HD*. This hypothesis was not supported. Although there was a trend toward greater sexual risk-taking in the AD/HD group compared with the non-AD/HD group, the difference was not statistically significant.

However, *it was also expected that youth with untreated AD/HD symptoms would report higher levels of risky sexual behavior than both youth with AD/HD currently taking stimulant medication, and youth without the disorder*. When the AD/HD group was divided according to treatment status (whether the youth were taking prescribed medication for AD/HD symptoms at the time of the study), the *untreated* AD/HD group reported significantly higher sexual risk-taking than the treated AD/HD group or the non-AD/HD group. Yet, the *treated* AD/HD group reported a similar level of sexual risk-taking to the non-AD/HD group. Thus, *untreated* AD/HD, rather than an AD/HD diagnosis per se, was associated with elevated sexual risk-taking.

The third hypothesis stated that *AD/HD symptom severity was expected to be positively related to sexual risk-taking dimensionally. Hyperactive-impulsive symptoms were also expected to be more strongly related than inattention symptoms.* This hypothesis was supported. Among the entire sample, AD/HD symptoms were related to sexual risk-taking on a dimensional basis. Greater current number of hyperactive-impulsive symptoms emerged as a significant predictor of greater sexual risk-taking, even after the significant demographic predictor, parent marital status, was taken into account. Inattention symptoms significantly predicted sexual risk-taking on their own, but were not significantly related to sexual risk-taking when parent marital status and hyperactive-impulsive symptoms were also entered as predictors. As expected, then, hyperactive-impulsive symptoms were more strongly related to sexual risk-taking than inattention symptoms.

Fourth, it was hypothesized that *AD/HD symptoms would explain unique variance in sexual risk-taking above and beyond other known predictors. Known predictors of sexual risk-taking (i.e., conduct problems) were expected to **partially mediate** the relationship between AD/HD and sexual risk-taking, but not entirely account for it.* Results regarding the third hypothesis were mixed. As predicted, hyperactive-impulsive symptoms did, in fact, account for an additional significant amount of variance in sexual risk-taking after previously identified predictors were taken into account. In a stepwise regression analysis, delinquency, depression, substance use, grades in school, and parenting style were entered as predictors of risky sexual behavior. Of these, delinquency emerged as the only significant predictor after parent marital status was controlled. When

number of current hyperactive-impulsive symptoms was then added, it remained a significant, though modest, predictor. Thus, consistent with the hypothesis, hyperactive-impulsive symptoms accounted for unique variance in sexual risk-taking above and beyond delinquency and parent marital status.

However, tests of mediation revealed that AD/HD symptoms, particularly inattention, may lead to sexual risk-taking indirectly through co-occurring difficulties. The modest relationship between greater inattention and greater sexual risk-taking was fully mediated by greater delinquency and poorer grades in school. Lower grades also mediated the relationship between greater hyperactivity-impulsivity and greater sexual risk-taking, though there remained a small (non-significant) correlation between hyperactivity-impulsivity and sexual risk-taking even after grades were taken into account. These findings suggest that youth with high levels of inattention may report elevated sexual risk-taking only by virtue of the connections of academic failure and delinquency to sexual risk-taking. Inattention was entirely unrelated to sexual risk-taking once grades and delinquency were taken into account. This provides support for the proposed *indirect* pathway from AD/HD to risky sexual behavior: perhaps inattention is translated into risky sexual behavior through academic failure and delinquency. Inattention puts youth at risk for these associated features of AD/HD, which in turn confer risk for sexual risk-taking. Counter to prediction, the other common co-occurring variables (i.e., depression, parenting style) did not emerge as mediators.

Finally, *among youth with AD/HD, female gender, conduct problems, substance use, depression, academic failure, and ineffective parenting style were expected to be*

associated with greater sexual risk-taking. This final hypothesis focused on correlates of sexual risk-taking within the AD/HD group. Despite the prediction that females would report greater risky sexual behavior, males and females in the AD/HD group reported similar levels of sexual risk-taking. Thus, prior speculations about females with AD/HD engaging in greater risk-taking than males with the disorder were not supported in this sample (Quinn, 2002; Conners, 1994). However, females in this group did report greater depression and greater parental psychological control than males. Also counter to prediction, no AD/HD subtype differences emerged. This was particularly surprising because hyperactivity-impulsivity was more strongly related to sexual risk-taking than inattention, which would have suggested that the Combined and Predominantly Hyperactive-Impulsive subtypes would be associated with greater sexual risk-taking than the Predominantly Inattentive type. One explanation for this null finding may be that symptom presentation within subtypes is heterogenous. For example, children with 5 hyperactivity-impulsivity symptoms and 6 inattention symptoms, as well as those with *no* hyperactivity-impulsivity symptoms and 6 inattention symptoms, would each meet criteria for the Predominantly Inattentive Type. Therefore subtyping does not necessarily distinguish among homogenous groups of youth. To combat this problem, if sufficient power permits, extreme subtype groups can be created by excluding “borderline” cases in a subtype category (such as those who display 4-5 symptoms of one symptom type and 6 of another). The null finding may have also been partly related to low power. Further segmenting the small AD/HD group into subtypes resulted in very small numbers in each group.

Being raised by a single parent emerged as a moderator of the relationship between AD/HD and risky sexual behavior. As was the case within the entire sample, having an unmarried primary caregiver was highly associated with greater sexual risk-taking within the AD/HD group. This is consistent with prior research findings that adolescents in single-parent homes become sexually active earlier and engage in more risky sexual behavior than those from two-parent homes, even when controlling for demographic factors (Day, 1992; Manlove, 1998). Furthermore, there was a significant interaction whereby having AD/HD *and* an unmarried parent was associated with the greatest degree of sexual risk-taking, to a much greater degree than youth in the other groups with an unmarried parent. In contrast, youth with AD/HD living with a married parent reported similar levels of sexual risk-taking to youth in the other groups with married parents. Youth with AD/HD appear to be at risk for sexual risk-taking only when their primary caregiver is not married.

The mechanisms for this particularly strong link are unclear, but research suggests several possibilities. Adolescents from divorced and single-parent families are at risk for problem behaviors and precocious adult-like behavior (Steinberg & Silk, 2002). Perhaps this is because single parents report greater economic disadvantage and less buffering against stress than married parents (Astone & McLanahan, 1991; Weinraub, Horvath, & Gringlas, 2002). Other possible explanations for these results include permissive sexual attitudes among single parents (Thornton & Camburn, 1987), poorer parental supervision capability by one parent versus two (Lauritsen, 1994), and parents' modeling of dating activities (Whitbeck, Simons, & Kao, 1994). Disrupted parenting processes may not be

the sole explanation, as single parenthood often remains a significant predictor in multivariate models even when parenting practices are controlled (Upchurch, Aneshensel, Sucoff, & Levy-Storms, 1999).

Specifically pertaining to youth with AD/HD, Barkley and colleagues (1990) found that in an eight year period, parents of hyperactive children were at three-fold risk for divorce or separation. Perhaps a third variable (i.e., genetic similarity) may explain both parent and child dysfunction, or preexisting parent characteristics such as depression may contribute both to child difficulties and likelihood of divorce (Frick, 1994). For example, among parents of children with AD/HD, several types of psychological difficulties such as AD/HD and depression are overrepresented (Faraone et al., 1995; Frick, 1994), and the presence of parental psychopathology is associated with greater comorbidity and adjustment problems in adolescents with AD/HD (Barkley, 1998). Perhaps these parental psychological difficulties lead to or are exacerbated by single parenthood. In any case, a single parent of a challenging adolescent with AD/HD may particularly struggle with high stress, low support, and parenting difficulties that, in turn, affect youth sexual risk-taking. This finding also supports an unanticipated indirect pathway leading from AD/HD to sexual risk-taking, whereby having AD/HD in the added presence of living with a single parent appears to set the stage for risky sexual behavior.

Other significant findings within the AD/HD group emerged with respect to treatment status. Youth with AD/HD who were taking medication for AD/HD symptoms at the time of the study ($n = 9$) reported significantly lower sexual risk-taking,

delinquency, substance use, and depression than unmedicated youth with AD/HD ($n = 23$). Taking medication for AD/HD symptoms was also a significant predictor of lower sexual risk-taking in the entire sample, even after parent marital status, delinquency, and number of hyperactivity-impulsivity symptoms were controlled. Interestingly, parents of medicated and unmedicated youth endorsed similar AD/HD symptom levels, though this probably reflects the explicit study instructions to rate youth's typical behavior when they were *not* taking medication.

One obvious explanation for the reduced sexual risk-taking among medicated youth is that reduction of core symptoms may lead to improved functioning in many domains, including sexual risk-taking. Yet because this was a correlational study, it cannot be inferred that taking medication for AD/HD reduces sexual risk-taking. There could be other explanations for the higher functioning of medicated youth. For example, perhaps medicated youth come from families with greater financial resources and access to healthcare, and this economic advantage serves as a buffer to risky sexual behavior. Also, the families of medicated youth may be more inclined to seek professional help when difficulties arise – leading to prevention or early intervention of problem behaviors. Greater parental knowledge about AD/HD may also characterize families of medicated youth, and perhaps parents who are more educated about AD/HD and its management respond more effectively and sensitively to child difficulties. Generally, monitoring by health professionals may also aid in healthy decision-making among adolescents. Regardless of these alternative explanations, the finding certainly suggests the possibility

that medication may reduce risky behaviors among youth with AD/HD – a possibility that should be explored.

Finally, substance use and delinquency proved to be strong, interrelated risk factors for sexual risk-taking among youth in the AD/HD group. In the AD/HD group, youth with delinquency above the median (of the entire sample) reported significantly greater sexual risk-taking than youth with AD/HD who had below-median delinquency (whose sexual risk-taking was similar to the non-AD/HD group). In fact, youth with *untreated* AD/HD who also reported high delinquency reported particularly elevated sexual risk-taking.

Although delinquency did not reach significance as a moderating variable, high substance use was identified as a moderator of the relationship between AD/HD and risky sexual behavior. There was a significant interaction between level of substance use (below vs. above average) and AD/HD diagnostic status, whereby youth with AD/HD *and* above average substance use reported the greatest sexual risk-taking. On the other hand, youth without AD/HD reported similar levels of sexual risk-taking regardless of substance use level. Therefore, in this study, substance use was a risk factor unique to the AD/HD group. This is despite the fact that the AD/HD group as a whole did not report greater substance use than the other two groups. Thus, although youth with AD/HD reported similar levels of substance use to the other groups, greater substance use was associated with greater sexual risk-taking *uniquely* within the AD/HD group. This unique association may be a function of underlying personality dimensions common to those with AD/HD and substance use, such as sensation seeking and low behavioral control

(Kalichman, Heckman, & Kelly, 1996). Substance use may also be related to sexual risk-taking more specifically and directly, in that alcohol or drug use immediately prior to a sexual encounter impairs risk perceptions (Norris, Nurius, & Dimeff, 1996), and the resulting decreased inhibition may increase the likelihood of sexual intercourse and decrease the likelihood of taking appropriate precautions (Jemmott & Jemmott, 1993; Strunin & Hingson, 1992). Perhaps youth with AD/HD, given their overactive and undercontrolled dispositions, are more susceptible to impaired decision-making when under the added influence of a substance that further reduces behavioral control. Once again, these findings suggest an indirect pathway from AD/HD to sexual risk-taking by way of other risky behaviors (delinquency, substance use). It appears that youth with AD/HD who do *not* engage in delinquency and substance use are not at increased risk for risky sexual behavior.

The current results replicated past findings that youth with AD/HD are vulnerable to sexual risk-taking as well as other difficulties (delinquency, academic failure). The study also expanded on past research by addressing methodological drawbacks and further illuminating the complex relationships among AD/HD, associated features, and sexual risk-taking. These findings extend results from males with the disorder to females, and from Caucasian youth to ethnic minority youth – in this study youth with AD/HD reported similar levels of risky sexual behavior regardless of sex or race. Additionally, information gleaned from this study begins to shed light on the mechanisms that may translate AD/HD into risky sexual behavior.

It seems as though *untreated* AD/HD is, in fact, associated with elevated risky sexual behavior. However, adding complexity, AD/HD only appears related to risky sexual behavior in the added presence of other risk factors – namely lack of treatment, living with a single parent, or engaging in high levels of substance use. On the other hand, medicated youth with AD/HD living in two-parent homes who reported low levels of substance use did *not* report elevated risky sexual behavior. This raises the possibility of previously unknown benefits of treatment, and underscores the need to attend to multiple interactive risk factors in youth with AD/HD. This also provides support for an *indirect* pathway from AD/HD to sexual risk-taking, as opposed to a direct pathway. Rather than AD/HD simply leading to sexual risk-taking by itself, it appears that other risk factors are required to translate AD/HD into risky sexual behavior.

The findings can also be interpreted in light of the predominant theory of AD/HD. Barkley's theory (1997) states that the core deficit of the disorder involves impaired behavioral inhibition. Perhaps the critical characteristic of at-risk youth with AD/HD (especially those who are unmedicated and engaging in delinquency and substance use) is an underlying lack of behavioral control that negatively influences decision-making in multiple domains. Perhaps medication increases behavioral control, leading to more thoughtful decision-making. Additionally, perhaps living in a two-parent home adds an element of external control through increased parental supervision. This explanation also fits with Problem Behavior Theory (Jessor & Jessor, 1977), which posits an underlying risk-taking disposition that explains youth involvement in multiple risk behaviors. Yet these findings also highlight that current theories do not yet enable comprehensive

understanding of these youth, given that not all youth with AD/HD report risky sexual behavior or other “problem behaviors.” Protective factors against such risk-taking are not yet well understood.

Other Findings

Although not central to the purposes of this project, other findings of interest emerged from the study. Consistent with past studies, youth with AD/HD were rated by their parents as having greater conduct problems than both other groups, and greater depression and academic failure than the non-AD/HD group. The borderline-AD/HD group, consisting of youth who met a few but not all DSM-IV AD/HD criteria, reported greater delinquency and depression than the non-AD/HD group, and their parents reported that they earned lower grades than the non-AD/HD group. The borderline-AD/HD group was likely comprised of youth who either: 1) had AD/HD in partial remission (subthreshold current symptoms); 2) had psychiatric difficulties (depression, anxiety, substance abuse disorders) that can produce AD/HD-like symptoms; or 3) characteristically displayed slightly high, though subthreshold, inattention and/or hyperactivity-impulsivity. Therefore, it is not surprising that they tended to report greater difficulties than the non-AD/HD group. Interestingly, when examining self-report data, the borderline-AD/HD group tended to report the greatest difficulties. Yet, when considering parent ratings, the AD/HD group was rated as the most impaired. This may be an artifact of an overall tendency of some parents to underreport their youth’s difficulties, resulting in lower reporting of AD/HD symptoms (leading to classification in

the borderline-AD/HD group) as well as other difficulties. This could also reflect lack of insight or defensiveness on the part of some youth in the AD/HD group.

Delinquency was the variable most highly correlated with sexual risk-taking. Ineffective parenting style was related to sexual risk-taking on its own, but did not differ among groups. However, less accepting and more psychologically controlling parenting was correlated with female gender, greater AD/HD symptoms, greater delinquency, and greater depression. Therefore, more negative parenting style may be indirectly related to sexual risk-taking as well, as it was related to other difficulties that were related to sexual risk-taking (hyperactivity-impulsivity and delinquency). Perception of greater peer sexual risk-taking was moderately correlated with greater sexual risk-taking in the entire sample, which is also consistent with past findings.

Greater inattention and hyperactivity-impulsivity symptoms were significantly associated with greater delinquency, lower grades in school, greater depression, and greater parental psychological control. This is consistent with previous studies finding that intrusive AD/HD behaviors may lead to a negative, coercive cycle of parent-child interactions (Danforth, Barkley, & Stokes, 1991; Barkley et al., 1992). However, this causality cannot be established in the current study, and it may in fact be the case that negative parenting style produced child outcomes (i.e., depression, anxiety) that created current AD/HD-like symptoms. Hyperactivity-impulsivity was also correlated with greater parental lax control in this study. Parenting efficacy tends to decrease over time among parents of youth with AD/HD, and some have suggested this waning parenting efficacy may “eventually lead to a caregiving style characterized by helplessness,

unresponsiveness, and withdrawal (Mash & Johnston, 1990, p. 321).” Perhaps the proposed cycle of coercive interactions, followed by withdrawal and helplessness, is reflected in the correlation between hyperactivity-impulsivity and lax parental control.

Integration of Findings: Pathways to Risky Sexual Behavior

The relationship between AD/HD and sexual risk-taking is not a simple linear association; AD/HD does not appear to be directly associated with risky sexual behavior on its own. Rather, AD/HD seems to increase vulnerability to other risk factors for sexual risk-taking (e.g., the effects of being raised by a single parent, delinquency). In this study, youth with AD/HD reported especially high levels of sexual risk-taking when they: 1) were unmedicated, 2) had an unmarried primary caregiver, or 3) reported greater substance use. Furthermore, these variables were associated with sexual risk-taking *to a greater degree* in the AD/HD group than in the non-AD/HD group, suggesting that AD/HD *plus* other risk factors is an especially risky combination. There was also greater clustering of risky behaviors in the AD/HD group than in the other groups, suggesting that youth with AD/HD may be unlikely to engage in one risky behavior without also engaging in others.

This cross-sectional, correlational study did not allow for exploring temporal unfolding of events or causal mechanisms. However, AD/HD likely preceded the other difficulties as parents were required to report early childhood onset (before age 7) for an AD/HD diagnosis. Based on the results of this study, Figure 13 presents a revised hypothetical pathway from AD/HD to risky sexual behavior. The pathway remains

speculative due to lack of causal or temporal information, but seems plausible given prior literature and the current results. It is proposed that adolescents with AD/HD who are unmedicated and/ or who have an unmarried parent are at risk for greater sexual risk-taking. In addition, these youth are more likely to display other problem behaviors (delinquency, substance use, academic failure) that also may lead to increased sexual risk-taking. Medication may be associated with higher functioning by way of symptom reduction, or through other mechanisms (i.e., parental involvement, treatment-seeking, access to healthcare, monitoring by a professional, parent education about AD/HD).

Similarly, common characteristics of unmarried parents may explain the effects of marital status. Single parents are more likely to have reduced financial resources, greater stress, and poorer supervision capabilities relative to married parents (Weinraub, Horvath, & Gringlas, 2002). Single parents may also model dating activities that are imitated by adolescents (Whitbeck et al., 1994). Perhaps these ramifications of single parenthood produce the environmental circumstances that allow for sexual risk-taking. Additionally, psychological disorders such as AD/HD and depression are more often found among parents of youth with AD/HD. For example, among parents of children with AD/HD, about 15-20% of mothers and 20-30% of fathers have AD/HD (Biederman, Faraone, Knee, & Munir, 1990), making it a distinct possibility that a child with AD/HD will have a parent with AD/HD in the home. Parents of children with AD/HD also report elevated levels of depression (Faraone & Biederman, 1997; Barkley et al., 1991), and adult depression leads to parenting deficits that exacerbate child difficulties (see Zahn-Waxler, Duggal, & Gruber, 2002). Parental psychopathology may then explain both the

likelihood for single parenthood *plus* impaired parenting skills that, in turn, negatively impact sexual risk-taking. These mechanisms should be explored in future studies.

These findings support an indirect rather than a direct pathway from AD/HD to sexual risk-taking. Based on these results, AD/HD does not seem to lead directly to risky sexual behavior on its own. Instead, AD/HD is a vulnerability factor that may increase the likelihood of sexual risk-taking in the added presence of other risk factors. For example, AD/HD may set the stage for conduct problems to develop in childhood. By adolescence, this may lead to association with deviant peers and engagement in a variety of risky behaviors, including substance use, delinquency, and sexual risk-taking. AD/HD can be viewed as a causal mechanism that initially influenced the development of conduct problems, and therefore AD/HD would be the first step in this indirect pathway toward sexual risk-taking. However, without the development of conduct problems or substance use, and with proper treatment for AD/HD, sexual risk-taking would not have been an inevitable outcome. The findings are hopeful – although AD/HD is a risk factor, sexual risk-taking is not an unavoidable outcome among these youth.

Future Research

Untreated AD/HD was associated with elevated levels of sexual risk-taking during adolescence, but this was not a simple relationship. Moderating and mediating variables emerged when effects of demographics and common co-occurring difficulties of AD/HD were explored. This highlights the importance of considering treatment status when grouping youth based on diagnostic status. Furthermore, it underscores the need to

assess for not only AD/HD symptoms, but for common co-occurring difficulties among youth with the disorder as well. Parent marital status was a moderating factor, suggesting that youth with AD/HD may be particularly vulnerable to the effects of having an unmarried primary caregiver. Therefore, future research should assess this risk factor and explore the mechanisms by which having an unmarried parent may confer risk in this population. As previously outlined, perhaps single parenthood is related to financial difficulties, reduced supervision capabilities, modeling of dating activities, or another factor (i.e., depression). All of these factors may set the stage for sexual risk-taking among teenagers. Conversely, future research should also aim to identify potential protective factors (i.e., married parents, positive relationships with parents, early identification and treatment of AD/HD, effective parenting style, religiosity, education about safe sexual practices) that may buffer against sexual risk among youth with AD/HD.

Questions remain about the nature of the relationships between AD/HD symptoms (treated vs. untreated), common co-occurring difficulties, and sexual risk-taking. Questions about causal mechanisms and temporal pathways could not be answered by this cross-sectional study. Future research should follow a large number of children prospectively to allow for inferences about causes or temporal sequences of events. A larger sample size will allow for sophisticated statistical methods (i.e., structural equation modeling) to outline pathways to sexual risk-taking. Questions that could be answered by future prospective or experimental studies include: Do features of AD/HD in childhood (i.e., age of onset, severity, comorbidity, treatment) predict adolescent risky behaviors?

Does treatment for AD/HD symptoms among adolescents reduce risky behaviors? If so, what types of treatment are beneficial, and what are the mechanisms by which treatment reduces risk? Does prevention of delinquency or academic failure protect against risky sexual behavior among youth with AD/HD? Do AD/HD symptoms lead to difficulty with effectively taking birth control or resisting impulses? These and many more questions remain to be answered.

Future projects should continue to include methods for diagnosing AD/HD according to complete DSM-IV criteria. Ideally, such diagnoses should rely on several independent sources of information to minimize reliance on self-report. Additionally, alternative objective methods for assessing sexual activity (i.e., STD and pregnancy history obtained from medical records) would bolster validity of the dependent measure. To enhance generalizability, future studies should also include youth of both sexes and varied ethnic and socioeconomic backgrounds.

Clinical Implications

Numerous clinical implications ensue from the findings. First, although causality cannot be established, current treatment with medication for AD/HD was associated with lower sexual risk-taking, delinquency, depression, and substance use. This suggests that, perhaps, AD/HD medications improve adolescent self-control and decision-making in a variety of domains. If future studies show that medication is a causal mechanism for reducing co-occurring difficulties (especially sexual risk-taking) in adolescence, this suggests that identification and treatment of adolescent AD/HD has previously unknown

benefits. For example, to the extent that medication reduces sexual risk-taking, perhaps youth with AD/HD can avoid negative consequences of sexual risk-taking (i.e., STDs) and delay childbearing until adulthood, which would benefit their families and society as well (Jaffee, 2002; Maynard, 1995). Finally, if medication does, in fact, decrease risk through symptom reduction, the common practice of allowing “medication holidays” on weekends and school vacations may be ill-advised, as academic functioning may not be the only domain that is positively impacted by medication.

In the current study greater youth AD/HD symptoms were correlated with a more psychologically controlling parenting style, which was itself related to greater youth depression and delinquency. Again, although causality cannot be established, interventions that address parenting style and the parent-child relationship may also be beneficial. Parent training interventions that teach parents to become more effective in managing child behavior have been found to improve child functioning (Pisterman, McGrath, Firestone, & Goodman, 1989) and, perhaps more importantly, to reduce parent stress and improve the parent-child relationship (Anastopoulos, Shelton, DuPaul, & Guevremont, 1993). Parent training may serve as a preventative measure against future comorbidity and sexual risk-taking. Once a child reaches adolescence, age-appropriate family treatment modalities for parents and adolescents, such as Problem Solving Communication Training (PSCT; Robin, 1981, 1998), may further equip adolescents and their parents with the communication and relationship building skills to combat the disrupted relationships and parent-adolescent conflict that may lead to delinquency, substance use, and sexual risk-taking. PSCT is a form of treatment in which the

adolescent is included and parent-adolescent negotiation and communication are emphasized.

In addition to the importance of identification and treatment of youth with AD/HD, these findings highlight the importance of attending to comorbidity, particularly delinquency and substance use, in this population. Clinicians assessing and treating AD/HD in adolescents should not limit their assessments and interventions to AD/HD symptoms. The costs and consequences of delinquency, substance use, and risky sexual behavior in youth include financial, educational, and emotional costs to the youth, their families, and society (Dryfoos, 1997). Thus, the current findings underscore the need for prevention and intervention efforts that address comorbid difficulties. Although stimulant medication is typically effective in alleviating core AD/HD symptoms, medication does not necessarily prevent the development of comorbid problems such as Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). As a neurobiological disorder, AD/HD is unlikely to be preventable in most cases (Biederman, Faraone, Mick, & Spencer, 1995; Levy, Hay, McStephen, Wood, & Waldman, 1997). Yet, CD is thought to develop largely from coercive family interaction patterns that can be sparked by frustrating AD/HD behaviors (Patterson et al., 1992). Therefore, these findings provide an additional rationale for the importance of parent training or other family interventions as an adjunctive treatment for youth with AD/HD.

When a child with AD/HD reaches adolescence, in addition to family modalities of treatment, individual cognitive-behavioral therapy may bolster self-efficacy and self regulation and reduce or prevent depression and other psychosocial difficulties (Curry,

2001), thereby buffering against sexual risk behavior (Whitbeck et al., 1992; Mezzich et al., 1997).

Lower grades in school mediated the relationship between inattention and hyperactivity-impulsivity and sexual risk-taking. In fact, inattention was no longer associated with sexual risk-taking whatsoever after school grades were taken into account. Although the direction of effect is not yet clear, perhaps to the extent that a student with AD/HD achieves well academically, sexual risk-taking will be reduced. Therefore, interventions that specifically target academic performance may also prove valuable beyond their direct effects as well. Students with AD/HD may be eligible to receive classroom accommodations that enable them to achieve to their potential. Common age-appropriate accommodations for high-schoolers include extended test-taking time, isolated test-taking environment, modified (shortened) assignments, and preferential seating (sitting in the front of the classroom). Less formal academic interventions such as tutoring by adults and peer tutoring may also be effective. If these modifications improve grades and hope for attending college, these adolescents may be motivated to avoid consequences (such as pregnancy) that would limit their academic attainment. Additionally, academic success may result in association with prosocial peers that avoid risky activities.

Additional prevention and intervention efforts may also be developed to specifically target sexual risk-taking in youth with AD/HD, particularly those with co-occurring conduct problems. Adolescents should be provided information about safe sexual practices early on, before sexual initiation takes place (Miller, Levin, Xu, &

Whitaker, 1998), and with a style that is sensitive and responsive to ensure transmission of the message (Dutra, Miller, & Forehand, 1999). Such sexual communication should be ongoing and sensitive to the child's developmental needs, and should be tailored to hold the youth's attention. Dittus and colleagues (2004) have developed a family intervention designed to promote sexual risk reduction for adolescents, and its components are also highly relevant to the difficulties that parents of children with AD/HD face. This intervention, entitled the Parents Matter! Program (PMP), involves informing parents about their children's vulnerability to sexual risk-taking, teaching positive parenting skills (including monitoring, relationship building, communication, and reinforcement), and teaching sexual communication skills (Dittus, Miller, Kotchick, & Forehand, 2004). While the program is newly developed, its solid foundation in theory and research indicates that it is a promising intervention. Families of children with AD/HD that are at high risk for negative outcomes, such as those with single parents, psychopathology, low socioeconomic status, or multiple children (Barkley, 1998), are prime targets for such promising prevention efforts. The relationship-building aspects of the intervention are likely to provide benefits that go beyond healthy sexual outcomes.

Limitations

Although promising, the results of this study must be tempered by a consideration of several limitations. The most significant limitation was the cross-sectional, retrospective design that prevented making causal inferences or establishing temporal sequence. Delinquency and academic failure were proposed as mediators that are

preceded causally by AD/HD symptoms and followed by sexual risk-taking. The results also suggest that treatment for AD/HD may serve as a buffer to risky behavior. Yet because of the cross-sectional design, these causal pathways remain speculative. However, the temporal sequence from AD/HD to CD has been supported by prior research (Loeber & Keenan, 1994), and AD/HD symptoms were likely present before the other difficulties in this study because parents were required to report early childhood onset for an AD/HD group classification. Although it seems unlikely to account for the findings, parent report on past and current symptoms could have been influenced by the youths' current behavior. It is possible that, due to frustration with their youth and a resulting negative bias, parents of risk-taking youth inflated their ratings of all types of symptoms, including past AD/HD symptoms. Therefore, future studies that follow children prospectively will be especially valuable.

Another limitation of the study was the sample size. The base rate of AD/HD in the general population is about 3-5% (APA, 1994), and the rate is even lower (around 1-2%) among adolescents (Cuffe et al, 2001). Therefore it was difficult to obtain a sufficiently large "AD/HD" group. The sample size prevented regression analyses within the AD/HD group and sophisticated analyses that may have allowed for more compelling inferences about pathways to sexual risk-taking. However, given this limitation, statistically significant results are particularly persuasive because they required fairly large effect sizes to achieve significance.

External validity may have been limited by selection bias in this study. Approximately 250 youth who were nominated refused to participate or could not be

reached by telephone. It is possible that youth who participated and those who refused or could not be reached may differ in some way that would impact study results. For instance, perhaps the most highly disorganized youth and families were not captured as participants in this project. Additionally, youth and their parents who are reluctant to participate in research about sexual activity may differ qualitatively from those who are willing to report their sexual experiences, limiting generalizability of these results to those who did not participate for whatever reason. However, external validity was bolstered in this study by the inclusion of large proportions of males and females, ethnic minority and Caucasian youth, and youth from varying socioeconomic backgrounds. Considering the relative lack of AD/HD research with females and ethnically diverse populations, this sample composition is informative and unique.

Other limitations include the reliance on self-report data from teenagers for many of the constructs, and the researcher's awareness of participants' group classification prior to their participation. The questionable accuracy of youth reports was somewhat counteracted by also obtaining parent-report data. Moreover, the degree of precision of parent-reported retrospective ratings of AD/HD symptoms during early childhood is uncertain. Again, this underscores the need for prospective studies. The researcher was typically not blind as to the adolescents' group status prior to their portion of participation, which may have biased youths' responses through subtle communications made by the researcher. However, it seems unlikely that responses were inadvertently influenced given the objectivity and multiple choice format of the measures.

Conclusion

Bearing these limitations in mind, the current findings support a relationship between untreated AD/HD and sexual risk-taking, as well as a dimensional relationship between greater hyperactivity-impulsivity symptoms and sexual risk-taking. They also suggest that delinquency, substance use, and having an unmarried primary caregiver may be of particular concern in this population. These findings are relevant to the fields of AD/HD research and adolescent pregnancy/ STD research. In the sexual risk-taking literature, research has focused on academic difficulties, conduct problems, substance abuse, depression, and poor relationships as risk factors for unsafe sexual practices, pregnancy, and STDs. Little effort has been made to uncover a common thread among these precursors. The results of this study suggest that AD/HD may be one common thread, because it typically precedes many of the risk factors for sexual risk-taking. In terms of AD/HD research, these results extend findings from adolescent boys to girls with the disorder, and to varying ethnic and socioeconomic backgrounds. They also shed light on pathways that may lead from childhood AD/HD to adolescent sexual risk-taking. It is hoped that the findings serve as an impetus for future research and development of clinical interventions that may improve the lives of adolescents with AD/HD and their families.

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APPENDIX A
TABLES AND FIGURES

Table 1
Measures and variables by reporter and method of completion.

Measure	Reporter		Method of completion		Variable Assessed
	Parent	Youth	Interview	Rating scale	
DISC-IV interview: AD/HD Module	X		X		AD/HD diagnosis
Family Information Questionnaire	X			X	Ethnicity, family income, mother's education level, marital status, youth's diagnostic status, medication status, grades in school
ADHD Rating Scale-IV	X			X	Frequency and severity of DSM-IV AD/HD symptoms
BASC-2, PRS-A: <ul style="list-style-type: none"> • Hyperactivity, Attention Problems subscales • Conduct Problems, Aggression subscales • Depression subscale 	X			X	<ul style="list-style-type: none"> • Developmental deviance of hyperactivity, inattention • Parent report of conduct problems • Parent report of depression
Children's Report of Parental Behavior Inventory (CRPBI)		X		X	Youth perception of parenting style
Vocabulary Subtest: WISC-IV or WAIS-III		X	X		Estimated verbal intelligence
Beck Depression Inventory-II (BDI-II)		X		X	Youth report of depression
Self Report Delinquency (SRD) Scale		X		X	Youth report of conduct problems
SRD Substance Use Subscale		X		X	Alcohol and drug use
Scale of Sexual Risk-Taking (SSRT)		X		X	Risky sexual behavior, perception of peers' sexual behavior

Notes: DISC-IV = Diagnostic Interview Schedule for Children – Fourth Edition; AD/HD = Attention-Deficit/ Hyperactivity Disorder; BASC-2, PRS-A = Behavior Assessment System for Children – Second Edition, Parent Rating Scales – Adolescent; WISC-IV = Wechsler Intelligence Scale for Children – Fourth Edition; WAIS-III = Wechsler Adult Intelligence Scale – Third Edition

Table 2

Descriptive statistics for parent- and youth-reported variables.

	Mean	Standard deviation
<u>Parent-reported variables</u>		
Number of IA symptoms (interview)	3.82	3.32
Number of H-I symptoms (interview)	2.41	2.71
Current IA frequency (ADHD RS)	2.28	3.12
Current H-I frequency (ADHD RS)	1.74	2.51
Conduct Problems (BASC-2) ^a	7.38	.79
Depression (BASC-2) ^a	7.47	.86
Grades in school	2.56	1.48
<u>Youth-reported variables</u>		
Sexual risk-taking score (SSRT) ^a	2.40	2.07
Delinquency score (SRD) ^a	3.34	1.69
Substance use score (SRD) ^a	1.20	.76
Depression score (BDI-II) ^a	3.15	1.32
Acceptance/ rejection (CRPBI)	162.50	27.14
Psychological control/ autonomy (CRPBI)	110.95	21.30
Firm/ lax control (CRPBI)	114.16	16.15

Notes: IA = Inattention; H-I = Hyperactivity-Impulsivity; ADHD RS = Attention-Deficit Hyperactivity Disorder Rating Scale – Fourth Edition; BASC-2 = Behavior Assessment System for Children – Second Edition; SSRT = Scale of Sexual Risk-taking; SRD = Self Report Delinquency; BDI-II = Beck Depression Inventory – Second Edition; CRPBI = Children’s Report of Parental Behavior Inventory

^a Square root transformation

Table 3

Demographic characteristics of adolescents and caretakers.

	AD/HD	Borderline-AD/HD	Non-AD/HD	Overall
<i>N</i>	32	28	40	100
Percent female	50%	71.4%	60%	60%
Age (years)				
Mean	16.84	16.44	16.82	16.72
Standard deviation	.86	.78	.84	.84
Ethnicity (%)				
African American	12 (37.5%)	13 (46.43%)	14 (35%)	39 (39%)
Caucasian	18 (56.25%)	13 (46.43%)	22 (55%)	53 (53%)
Other	2 (6.25%)	2 (7.14%)	4 (10%)	8 (8%)
Family income (%)				
\$0-15,000	8 (25%)	5 (17.86%)	5 (12.5%)	18 (18%)
\$15,000-45,000	11 (34.38%)	8 (28.57%)	15 (37.5%)	34 (34%)
\$45,000-75,000	5 (15.63%)	8 (28.57%)	8 (20%)	21 (21%)
>\$75,000	8 (25%)	7 (25%)	12 (30%)	27 (27%)
Caretaker education level ^a (%)				
Not finish high school	4 (12.5%)	4 (14.29%)	1 (2.56%)	9 (9%)
H.S. diploma/ GED	6 (18.75%)	2 (7.14%)	7 (17.95%)	15 (15%)
Some college	14 (43.75%)	13 (46.4%)	17 (43.6%)	44 (44%)
Bachelor's degree +	8 (25%)	9 (32.14%)	14 (35.9%)	31 (31%)

Notes: AD/HD = Attention-Deficit/ Hyperactivity Disorder; % = percent of group

^aData missing for 1 participant on education level.

Table 4

Group differences in associated features of AD/HD.

	AD/HD	Borderline-AD/HD	Non-AD/HD
^a Parent reported conduct problems***	7.85	7.38	7.02
^a Self reported delinquency**	3.56	3.94	2.67
Grades in school (range 1-5)***	3.29	2.69	1.87
^a Parent reported depression**	7.78	7.58	7.15
^a Self reported depression**	3.13	3.76	2.71
^a Substance use	1.11	1.27	1.18
^b Acceptance/ rejection	159.53	159.79	167.06
Psychological control/ autonomy*	116.32	115.26	103.25
^b Firm/ lax control	118.56	111.07	112.74

Notes: AD/HD = Attention-Deficit/ Hyperactivity Disorder; ^a square root transformation was applied; ^b higher value = more positive parenting style (on all other variables, higher values indicate greater problems/ symptoms)

* = $p < .05$

** = $p < .01$

*** = $p < .001$

Table 5. Intercorrelations among variables used for multiple regression analyses.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Sexual risk-taking	--																					
2. Gender ^a	.15	--																				
3. Age	-.04	-.28**	--																			
4. Ethnicity	-.24**	-.16	.30**	--																		
5. Parent education level	-.26**	-.01	.19	.50**	--																	
6. Family income	-.33**	-.10	.16	.40**	.47**	--																
7. Parent marital status	.41**	.18	-.17	-.31**	-.32**	-.55**	--															
8. Childhood # IA symptoms	.06	-.34**	.18	.05	-.10	-.06	-.12	--														
9. Childhood # H-I symptoms	.00	-.30**	.11	.09	-.07	-.03	-.09	.87**	--													
10. Current IA frequency	.26**	-.17	.10	-.01	-.05	-.11	.16	.65**	.57**	--												
11. Current H-I frequency	.22*	-.20*	.05	.03	-.11	-.14	.15	.67**	.76**	.74**	--											
12. Current # IA symptoms	.20*	-.16	-.01	-.08	-.20	-.15	.14	.64**	.57**	.81**	.69**	--										
13. Current # H-I symptoms	.24*	-.16	.09	-.07	-.16	-.14	.03	.69**	.75**	.55**	.79**	.67**	--									
14. Self-report delinquency	.63**	-.05	-.21*	-.22*	-.26**	-.27**	.43**	.08	-.02	.38**	.25*	.33**	.10	--								
15. Parent rpt conduct probs	.40**	-.09	-.01	.06	-.02	-.13	.25*	.26**	.26*	.52**	.56**	.45**	.41**	.55**	--							
16. Grades	.31*	-.18	.00	-.14	-.34**	-.21*	.25*	.33**	.33**	.55**	.50**	.56**	.36**	.54*	.42**	--						
17. Substance use	.36**	-.04	.09	.13	.09	.01	.22*	-.10	-.17	.16	.04	-.05	-.07	.49**	.36**	.09	--					
18. Self-report	.37**	.22*	-.20*	-.25*	-.20	-.25*	.29**	-.07	-.13	.15	.05	.13	-.03	.56**	.25*	.28**	.38**	--				

depression																						
19. Parent-report depression	.18	.07	.14	-.03	-.05	-.17	.18	.15	.19	.31**	.34**	.34**	.40**	.12	.40**	.29**	.14	.30**	--			
20. Acc/rejection	-.34**	-.20*	.25*	.20*	.32**	.22*	-.20	-.04	.05	-.14	-.12	-.12	-.04	-.47**	-.35**	-.32**	-.16	-.40**	.01	--		
21. Control/autonomy	.23*	.22*	-.30**	-.38**	-.39**	-.31**	.16	.20*	.19	.29**	.27**	.29**	.23*	.38**	.20*	.38**	.01	.46**	.19	-.44**	--	
22. Firm/ lax control	-.13	-.09	-.06	-.27**	-.13	-.07	-.12	.25*	.21*	.02	.08	.17	.23*	-.19	-.05	.11	-.36**	-.04	.08	.10	.32**	--

Notes: ^a Male = 1, Female = 2; IA = Inattention; H-I = Hyperactivity-Impulsivity
* = $p < .05$; ** = $p < .01$

Table 6

Summary of preliminary stepwise multiple regression analysis for predicting sexual risk-taking with demographic variables.

	<i>Adj. R^2</i>	<i>B</i>	<i>SE B</i>	<i>β</i>	<i>p</i>
<u>Predictor in final model</u>					
Parent marital status	.16	1.71	.39	.41	<.001
<u>Excluded variables</u>					
Child age				.03	.73
Child gender				.08	.41
Child ethnicity				-.12	.21
Parent income				-.15	.17
Parent education level				-.15	.14

Table 7

Summary of preliminary stepwise multiple regression analysis for predicting sexual risk-taking with parent marital status and AD/HD variables.

	$\Delta \text{Adj. } R^2$	B	$SE\ B$	β	p
<u>Predictors in final model</u>					
Parent marital status	.16	1.68	.38	.40	<.001
# H-I symptoms	.04	.17	.07	.23	.01
Total $\text{Adj. } R^2 = .20$					
<u>Excluded variables</u>					
IA frequency				.11	.33
H-I frequency				-.06	.71
# IA symptoms				-.02	.90
Notes: AD/HD = Attention-Deficit/ Hyperactivity Disorder; IA = Inattention; H-I = Hyperactivity-Impulsivity					

Table 8

Summary of primary stepwise multiple regression analysis for predicting sexual risk-taking.

	<i>Δ Adj. R^2</i>	<i>B</i>	<i>SE B</i>	<i>β</i>	<i>p</i>
<u>Predictors in final model</u>					
Parent marital status	.16	.69	.35	.16	.05
Self-report delinquency	.25	.60	.11	.49	<.001
# H-I symptoms	.03	.19	.06	.24	.004
Medication status	.02	1.01	.50	.18	.03
Total <i>Adj. R^2</i> = .46					
<u>Excluded variables</u>					
Parent report conduct problems				-.06	.56
Parent report depression				.05	.54
Grades in school				-.11	.29
Substance use				.09	.32
Self report depression				.02	.81
Acceptance/ rejection				-.04	.69
Control/ autonomy				-.05	.57
Firm/ lax control				-.04	.64

Notes: AD/HD = Attention-Deficit/ Hyperactivity Disorder; H-I = Hyperactivity-Impulsivity

Table 9

Summary of six multiple regressions for testing delinquency and school grades as mediators of the relationship between inattention and sexual risk-taking.

Regressions	Total <i>Adj. R</i> ²	<i>B</i>	<i>SE B</i>	β	<i>p</i>
1. Outcome variable: Delinquency					
Predictor: Inattention symptoms	.10	.17	.05	.33	.001
2. Outcome variable: Sexual risk-taking					
Predictor: Inattention symptoms	.03	.12	.06	.20	.05
3. Outcome variable: Sexual risk-taking					
Predictors:	.39				
Inattention symptoms		-.01	.05	-.01	.90
Delinquency		.78	.10	.64	<.001
1. Outcome variable: School grades					
Predictor: Inattention symptoms	.30	.25	.04	.56	<.001
2. Outcome variable: Sexual risk-taking					
Predictor: Inattention symptoms	.03	.12	.06	.20	.05
3. Outcome variable: Sexual risk-taking					
Predictors:	.08				
Inattention symptoms		.02	.07	.03	.77
School grades		.41	.17	.29	.02

Table 10

Summary of three multiple regressions for testing school grades as a mediator of the relationship between hyperactivity-impulsivity and sexual risk-taking.

Regressions	Total <i>Adj. R</i> ²	<i>B</i>	<i>SE B</i>	<i>β</i>	<i>p</i>
1. Outcome variable: School grades					
Predictor: H-I symptoms	.12	.20	.05	.36	<.001
2. Outcome variable: Sexual risk-taking					
Predictor: H-I symptoms	.05	.18	.08	.24	.02
3. Outcome variable: Sexual risk-taking					
Predictors:	.10				
H-I symptoms		.11	.08	.15	.16
School grades		.36	.15	.26	.01

Note: H-I = Hyperactivity-Impulsivity

Figure 1. *Hypothetical pathways from Attention-Deficit/Hyperactivity Disorder to risky or healthy sexual behavior.*

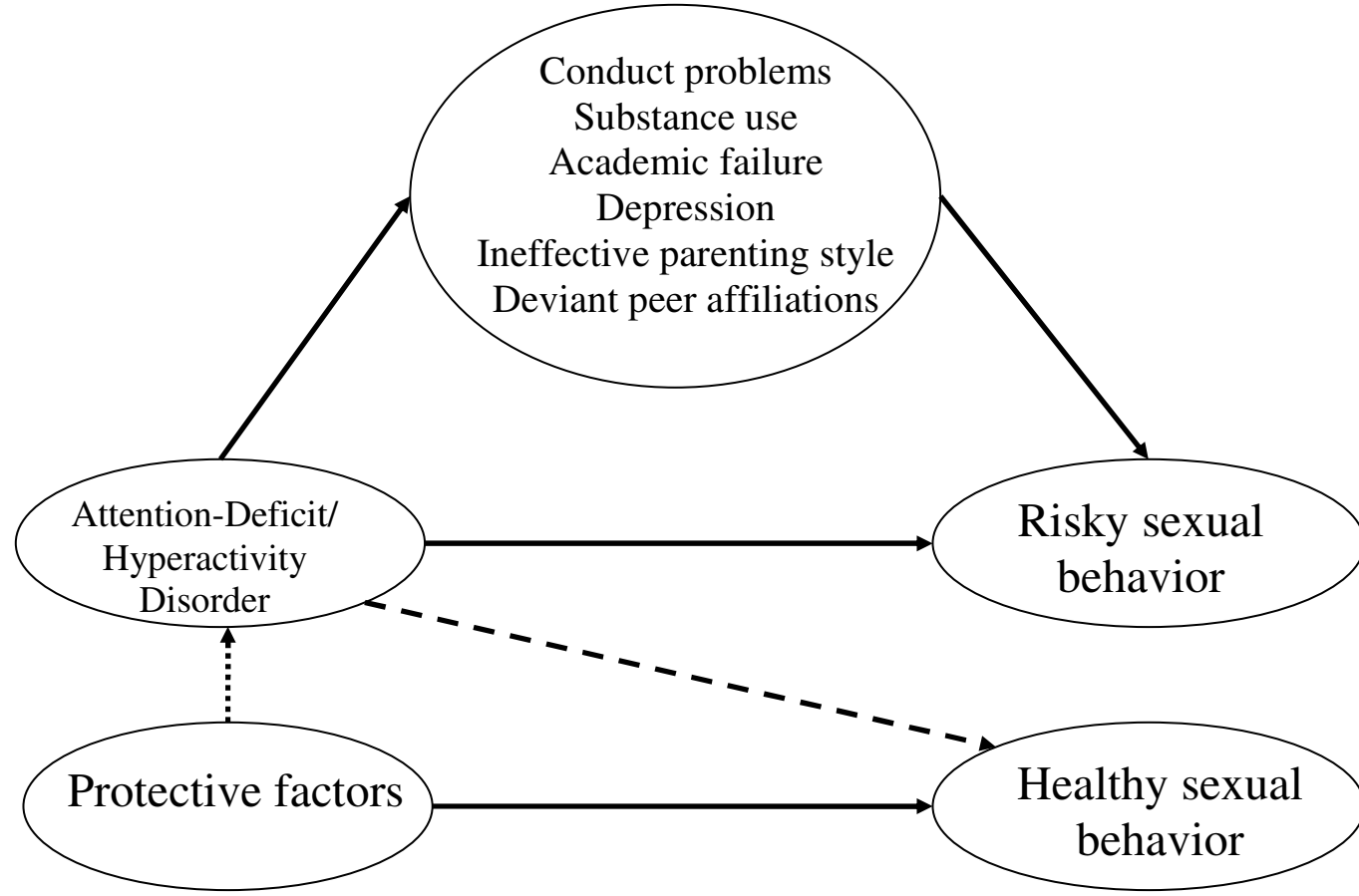


Figure 2

Barkley's (1997) model of AD/HD.

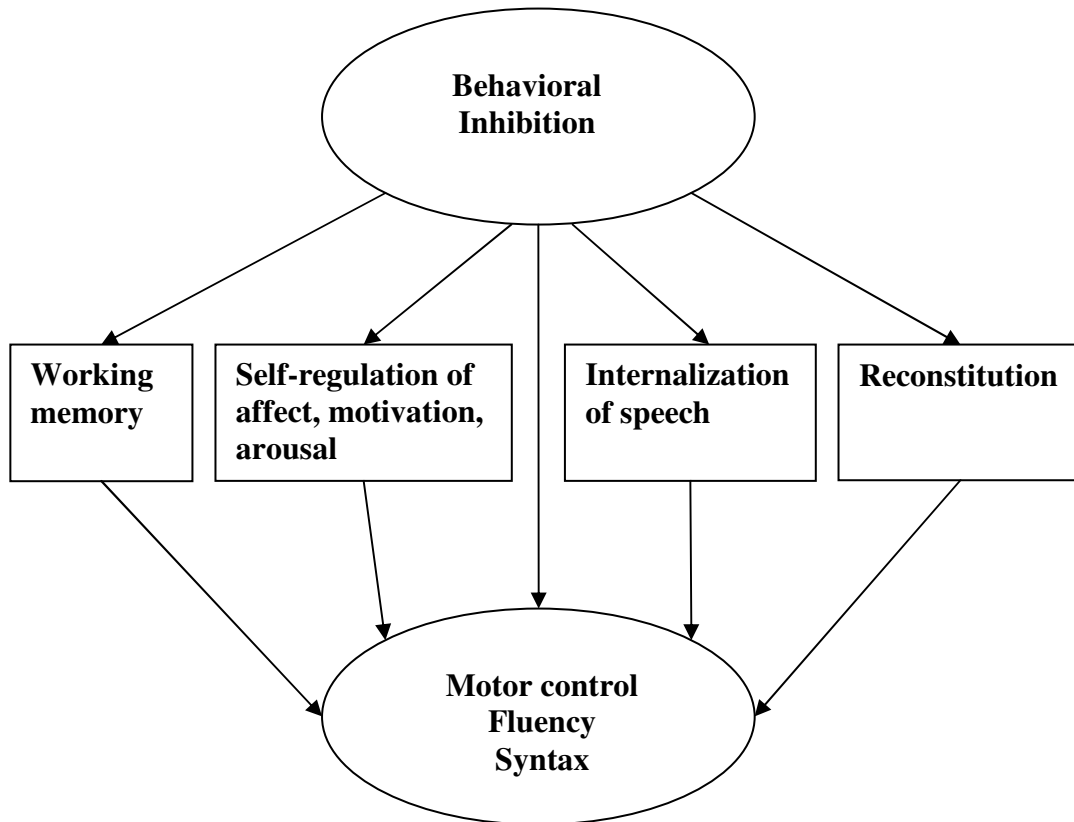
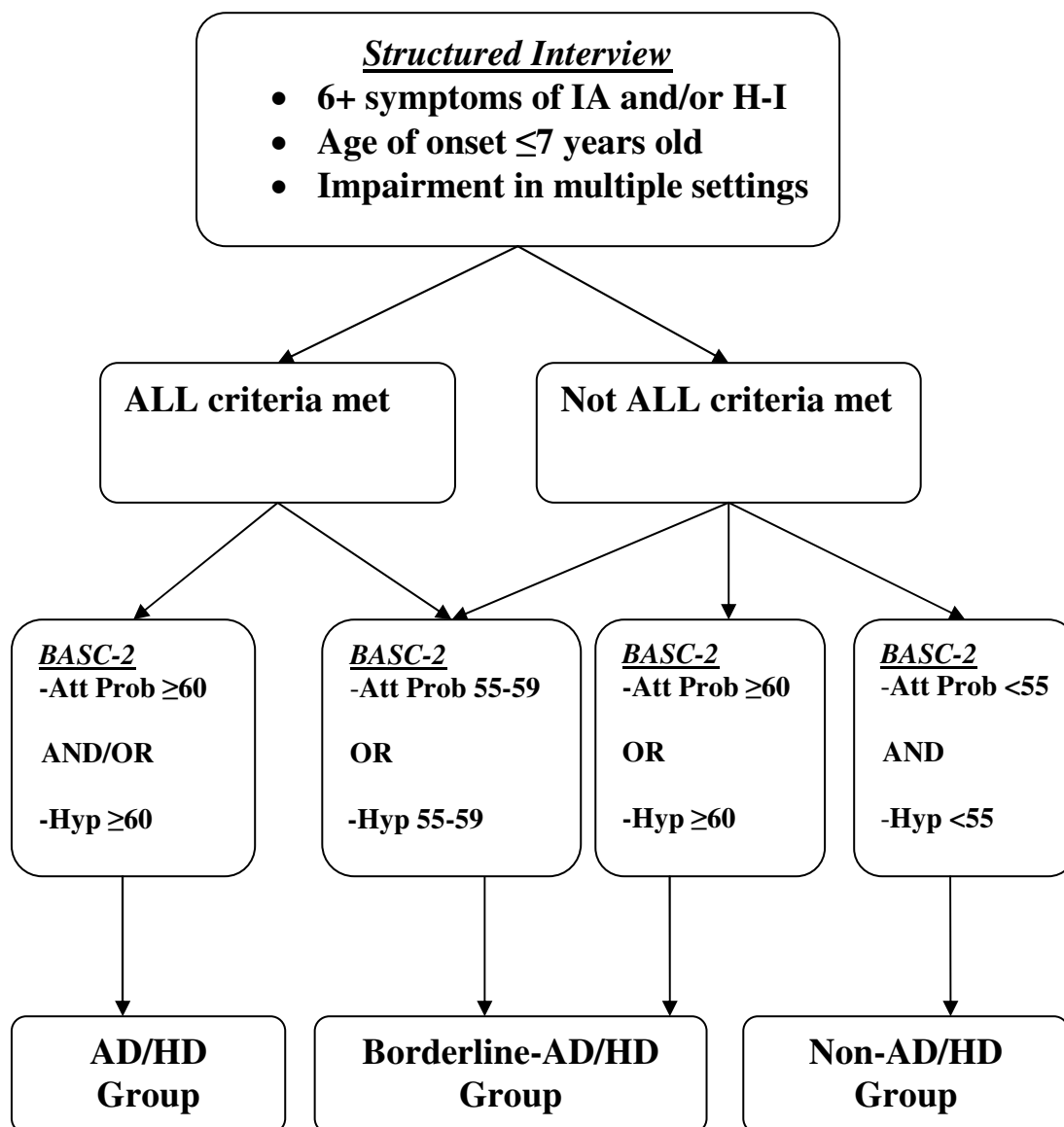


Figure 3

Decision-making process for classifying youth into groups.



Notes: BASC-2 = Behavior Assessment System for Children – Second Edition; Att Prob = Attention problems; Hyp = Hyperactivity; AD/HD = Attention-Deficit/ Hyperactivity Disorder

Figure 4

Mean sexual risk-taking scores by group.

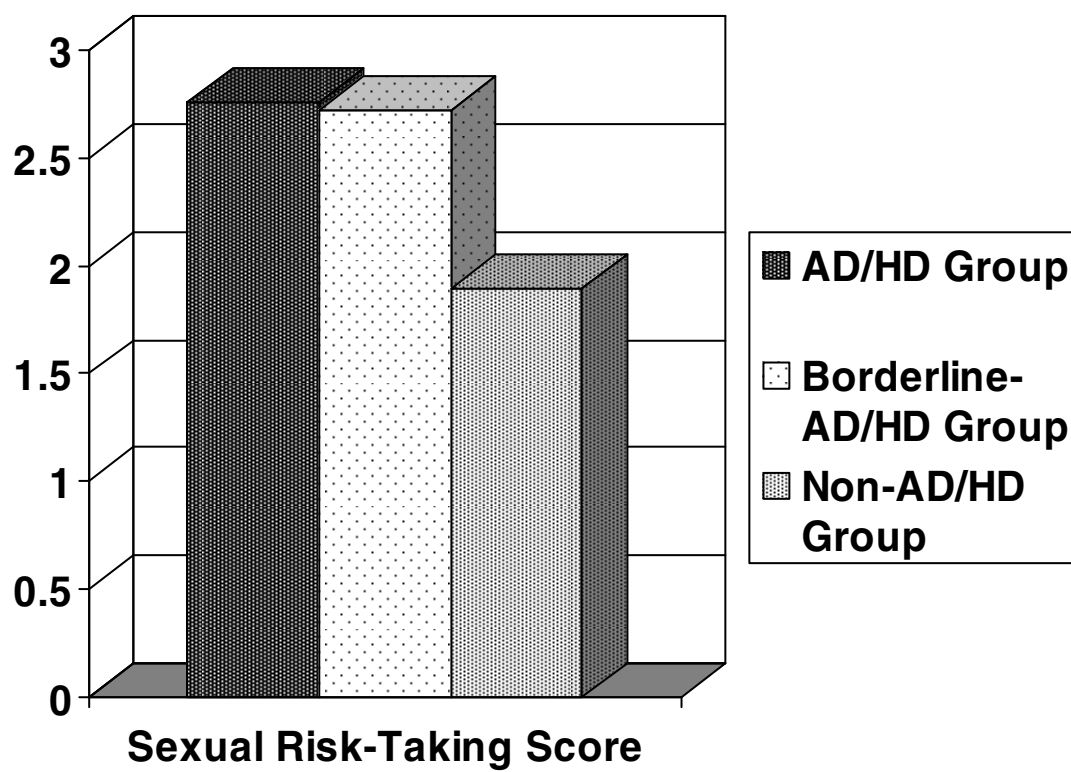


Figure 5

Mean sexual risk-taking scores by group when considering medication status.

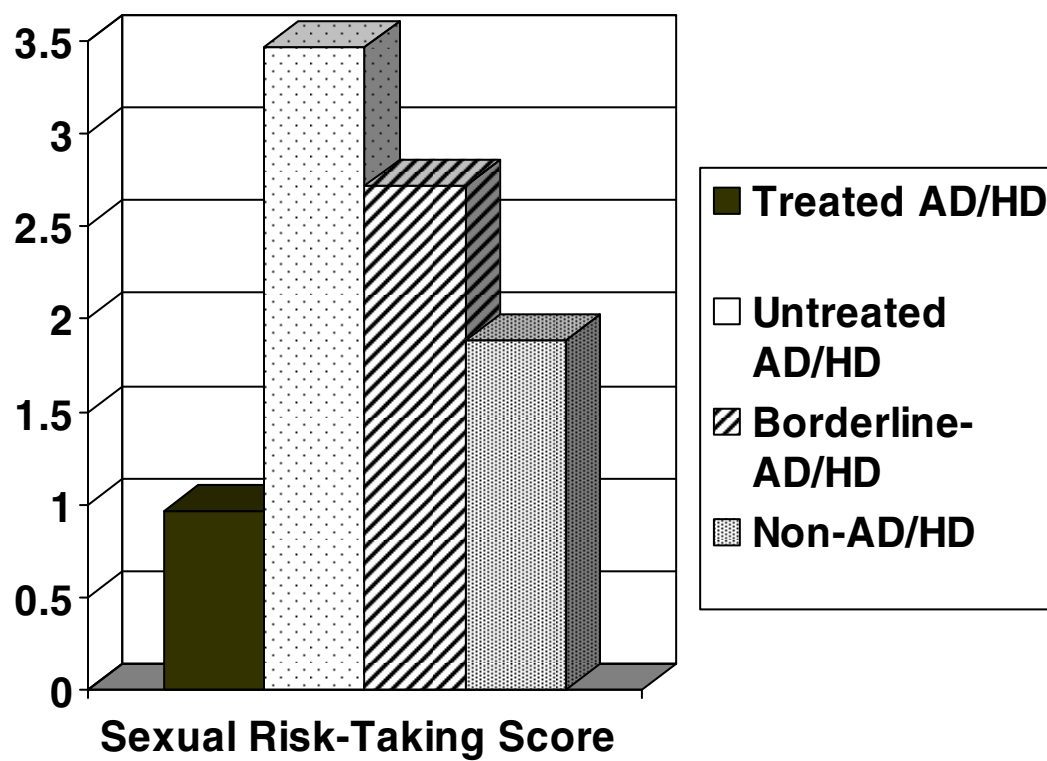
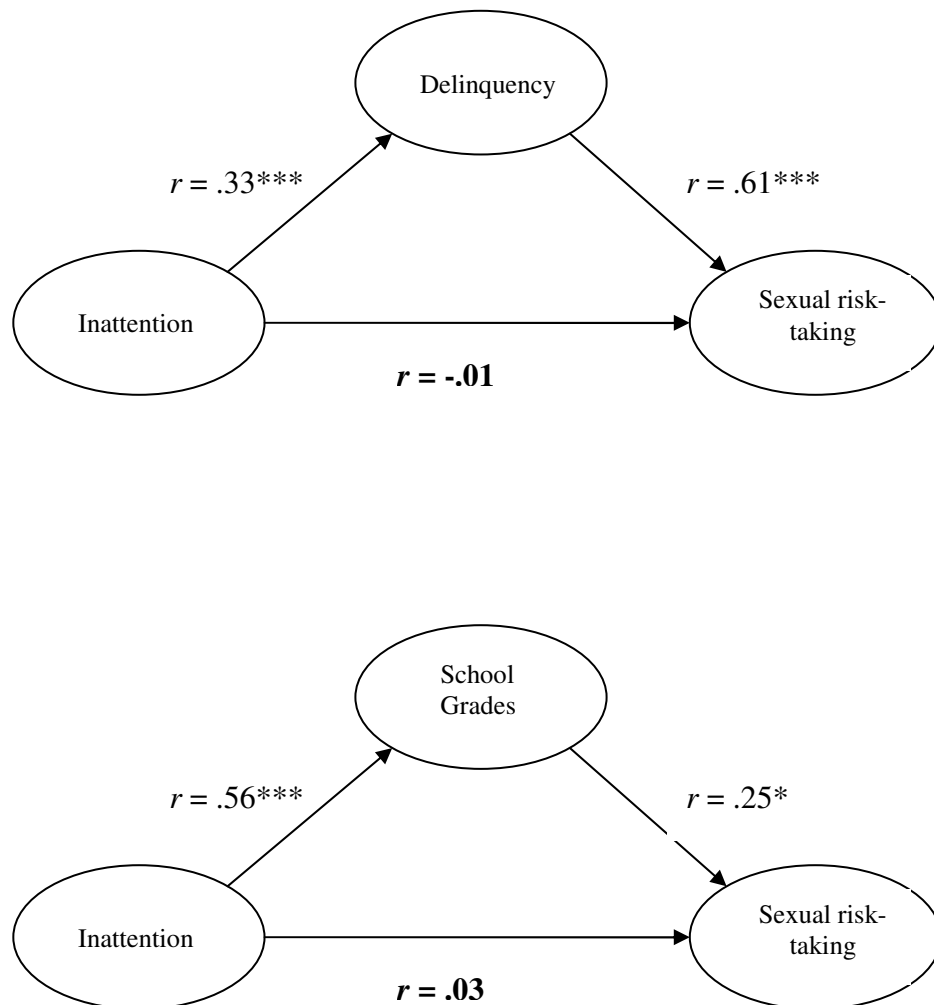


Figure 6

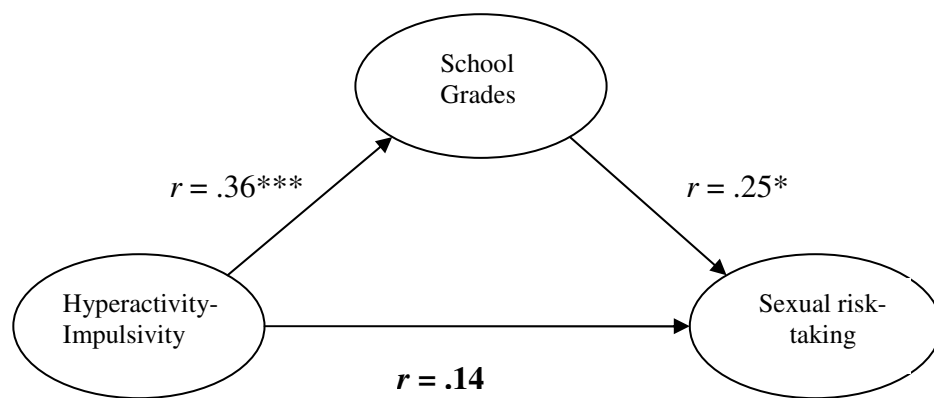
Delinquency and school grades as mediators of the relationship between inattention and sexual risk-taking.



Notes: $*p < .05$; $***p < .001$

Figure 7

School grades as a mediator of the relationship between hyperactivity-impulsivity and sexual risk-taking.



Notes: * $p < .05$; ** $p < .01$; *** $p < .001$

Figure 8

Mean sexual risk-taking scores by group according to primary caregiver's marital status.

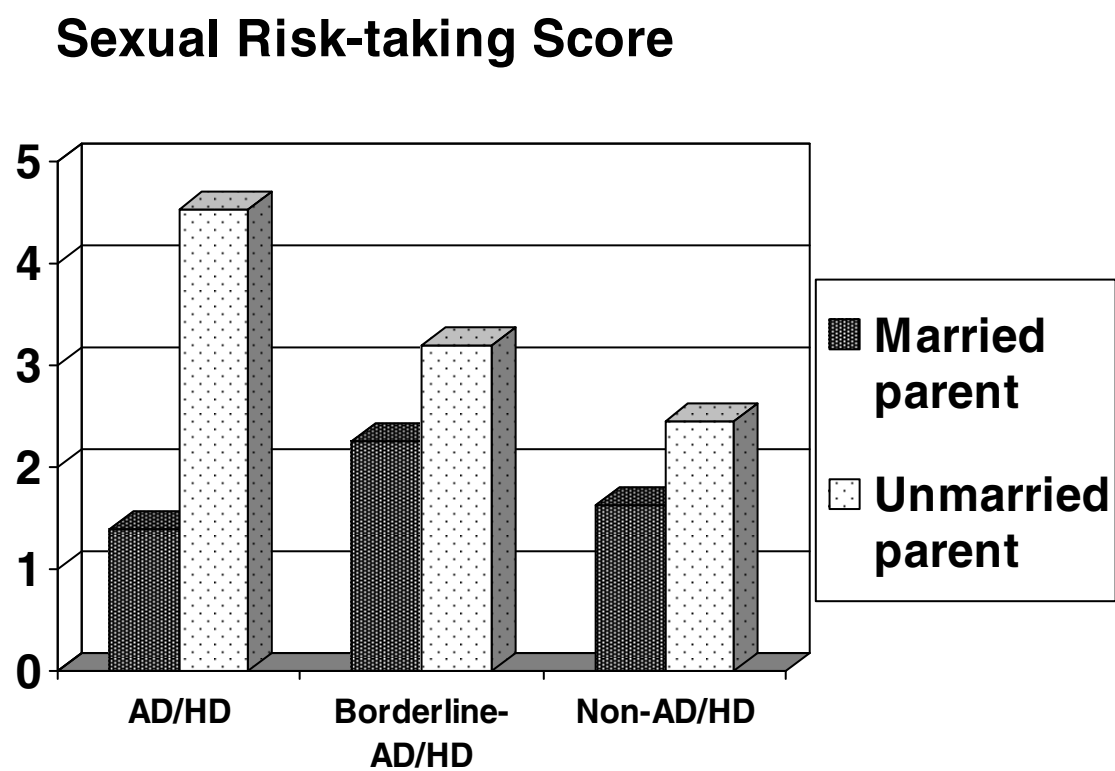


Figure 9

Mean self-reported depression, delinquency, and substance use scores by treatment status (on vs. off AD/HD medication) within the AD/HD group.

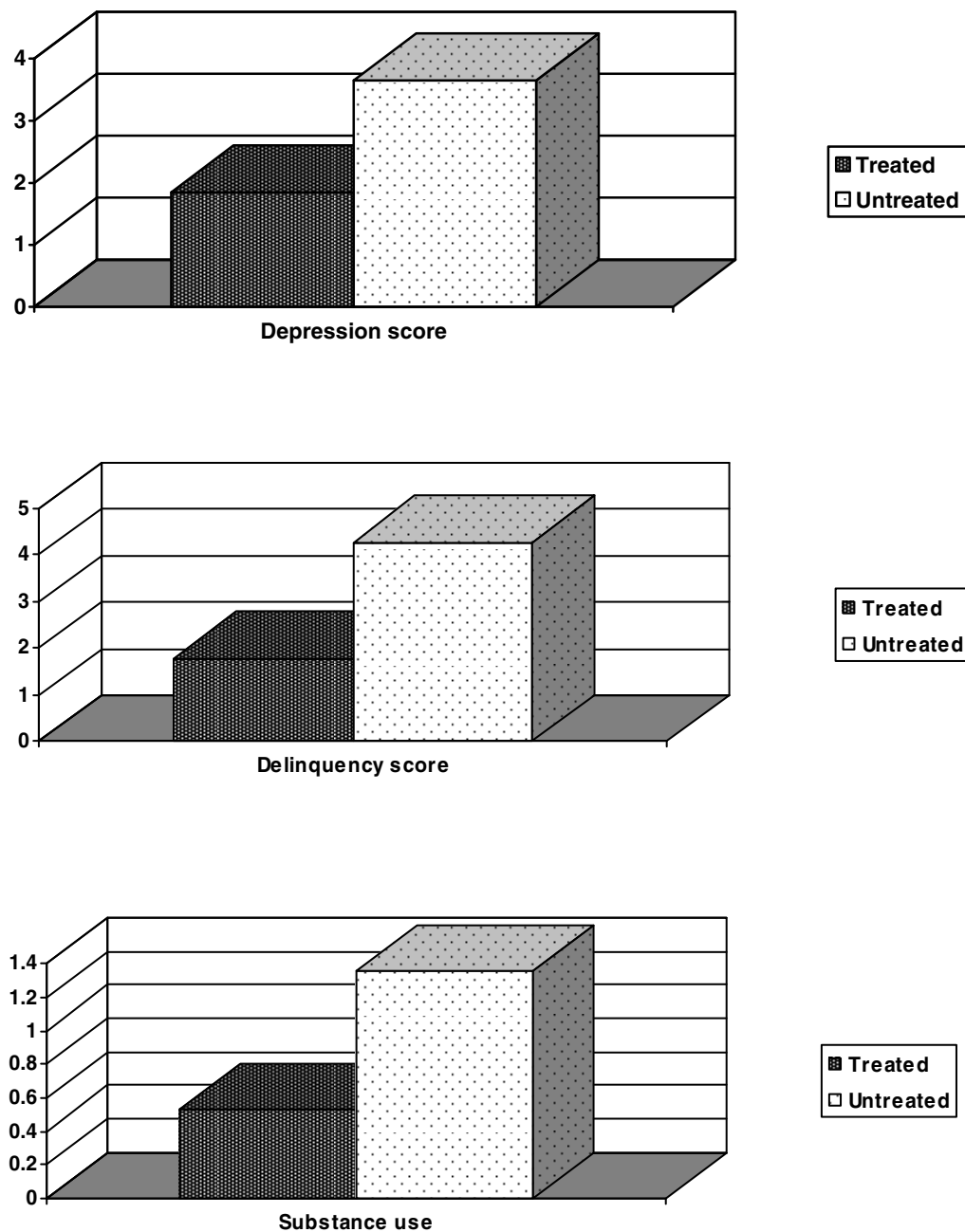


Figure 10

Mean sexual risk-taking scores within the AD/HD group by low (below-median) vs. high (above-median) delinquency.

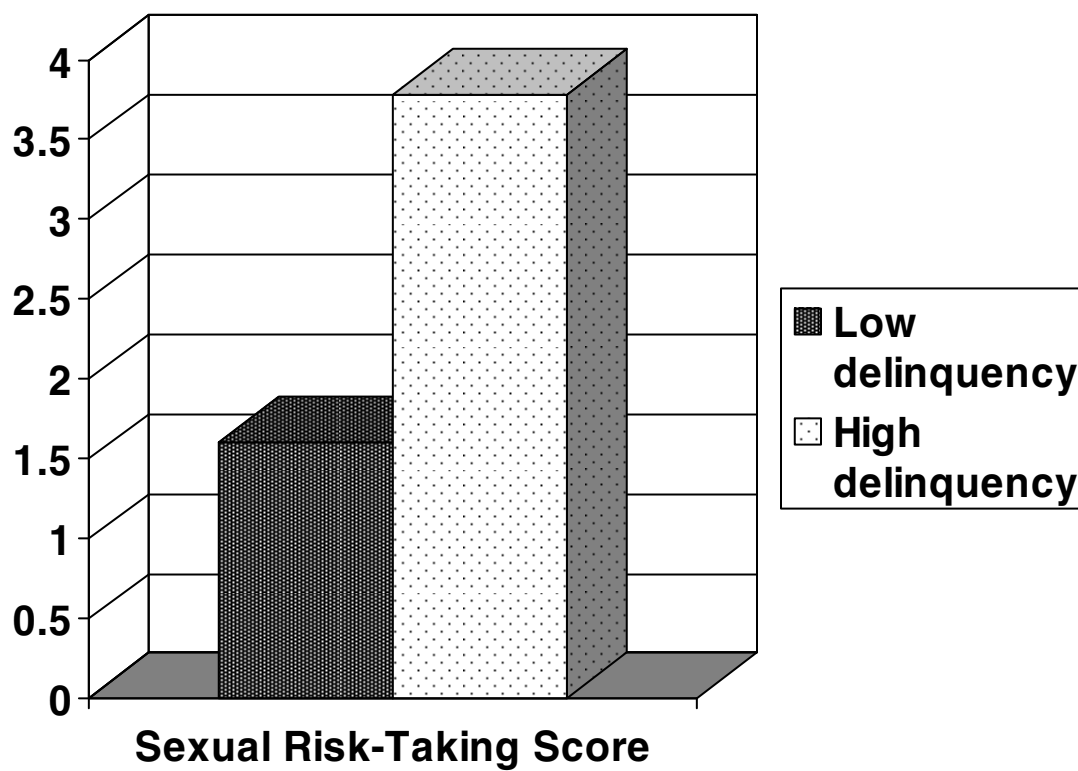


Figure 11

Mean sexual risk-taking scores by medication status and delinquency status within the AD/HD group.

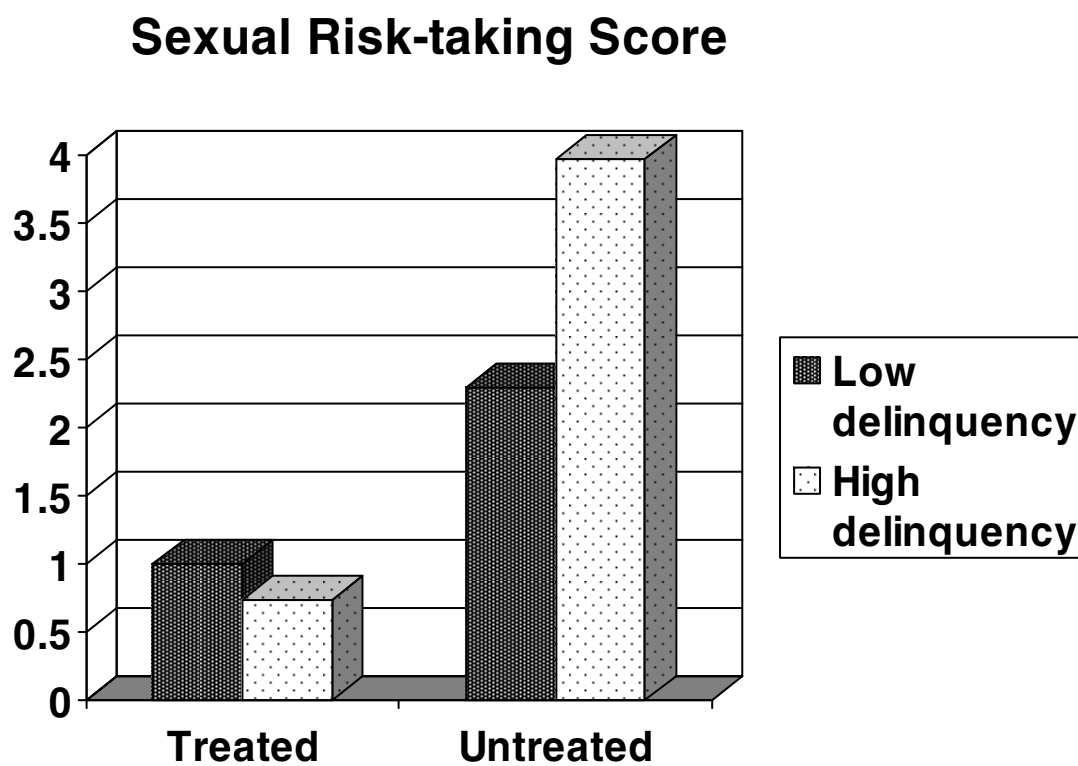


Figure 12

Mean sexual risk-taking scores by substance use level and AD/HD grouping.

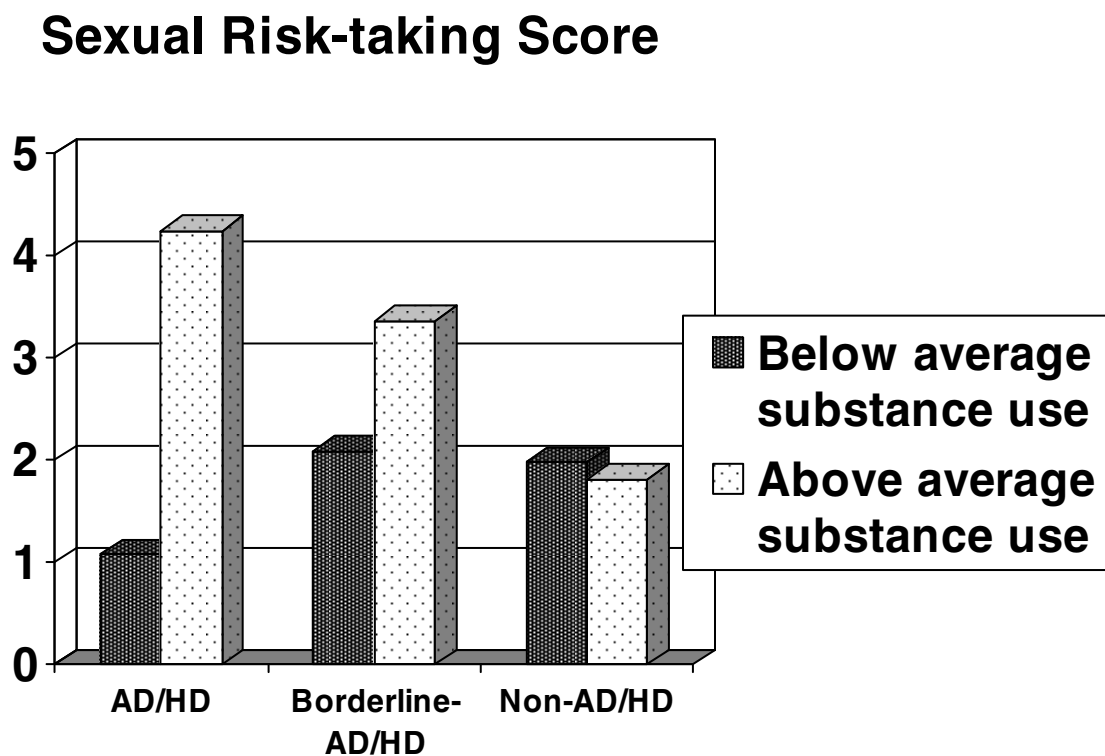
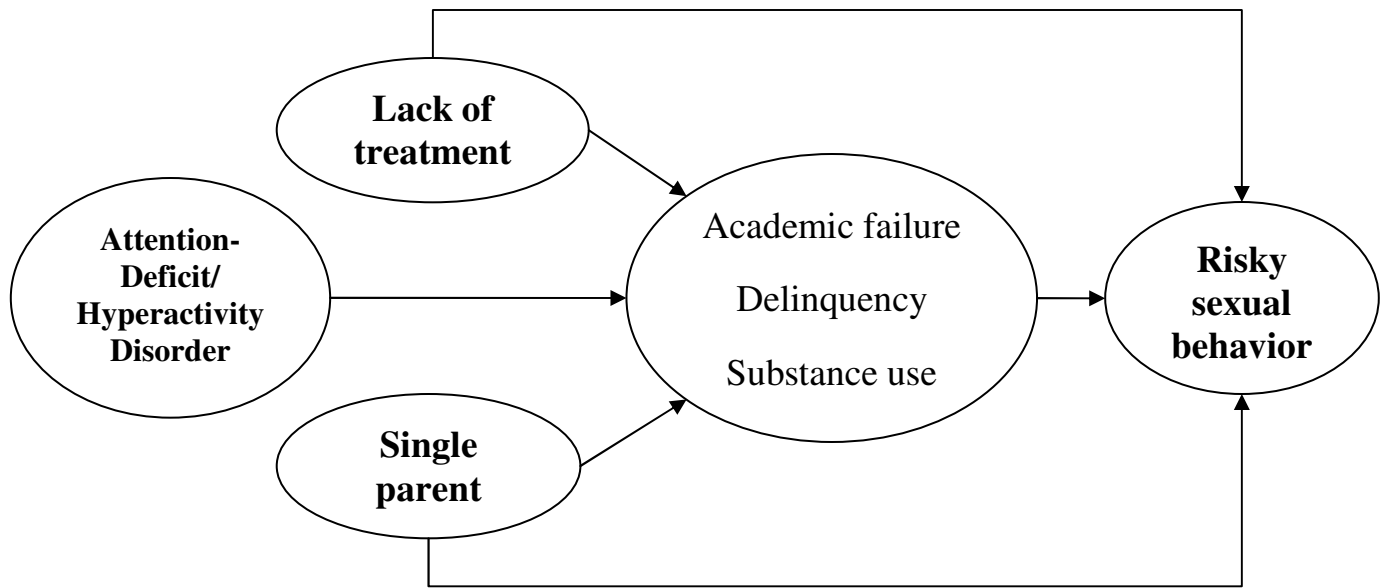


Figure 13. *Proposed pathways to risky sexual behavior among youth with AD/HD.*



APPENDIX B

Scale of Sexual Risk-taking (adapted from Metzler et al., 1992)

SSRT

Instructions: These questions ask how often you have done different things. Please circle your answer for each question. Remember, your answers are confidential.

1. Have you ever had oral sex with someone? YES NO

2. How old were you the first time you had oral sex? _____ years old

3. How many DIFFERENT PEOPLE have you had oral sex with?

In the LAST 3 MONTHS: 0 1 2 3 4 5 or more

In the LAST YEAR: 0 1 2 3 4 5 or more

In your ENTIRE LIFE: 0 1 2 3 4 5 or more

4. Have you ever had sexual intercourse with a member of the opposite sex? YES NO

5. How old were you the first time you had sexual intercourse? _____ years old

6. How many TIMES have you had sex with someone of the opposite sex?

In the LAST 3 MONTHS: 0 1-2 3-5 5-10 11-50 over 50

In the LAST YEAR: 0 1-2 3-5 5-10 11-50 over 50

7. How many DIFFERENT PEOPLE of the opposite sex have you had sex with?

In the LAST 3 MONTHS: 0 1 2 3 4 5 or more

In the LAST YEAR: 0 1 2 3 4 5 or more

In your ENTIRE LIFE: 0 1 2 3 4 5 or more

8. How many opposite sex partners have you had sex with who were also having sex with other people?

In the LAST 3 MONTHS: 0 1 2 3 4 5 or more

In the LAST YEAR: 0 1 2 3 4 5 or more

9. How many TIMES have you had sex with someone who has ever shot (injected) IV drugs?

In the LAST 3 MONTHS: 0 1 2 3 4 5 or more

In the LAST YEAR: 0 1 2 3 4 5 or more

10. How many TIMES have you had sex with someone whom you did not know very well?

In the LAST 3 MONTHS: 0 1 2 3 4 5 or more

In the LAST YEAR: 0 1 2 3 4 5 or more

11. In the LAST YEAR when you had sex, how often did you use *some kind of birth control*?

Never Sometimes About half Most times Every time

What type(s) of birth control did you use in the last year? _____

12. In the LAST YEAR when you had sex, how often did you or your partner wear a condom (rubber)?

Never Sometimes About half Most times Every time

13. Generally, in the LAST YEAR, how often have you or your partner drunk alcohol immediately before or during sexual activities?

Never Sometimes About half Most times Every time

14. Generally, in the LAST YEAR, how often have you or your partner used marijuana or drugs immediately before or during sexual activities?

Never Sometimes About half Most times Every time

15. Have you ever had anal sex with someone? YES NO

16. How many DIFFERENT TIMES have you had a sexually transmitted disease (such as Chlamydia, Gonorrhea, or herpes)? _____times

17. FEMALES: Have you ever been pregnant before? YES NO

MALES: Have you ever gotten a female pregnant before? YES NO

18. About how many of your friends (people your age that you hang out with) do you think have had sex with someone of the opposite sex?

None A few About half Most of them Almost all of them

19. About how often do you think your friends/ people you hang out with who are sexually active use protection such as condoms or birth control?

Never Sometimes About half the time Most of the time Always

APPENDIX C

Family Information Questionnaire

Instructions: Please answer the following questions about your family.

1. What is your date of birth? _____

2. How would you describe your child's ethnicity? 3. What is your marital status?

_____ African American

_____ Married

_____ Latino

_____ Divorced

_____ Caucasian

_____ Single/ Never been married

_____ Asian American

_____ Partnered

_____ Native American

_____ Separated

_____ Other/ Biracial

_____ Widowed

4. What is your approximate annual family income (for your household)?

5. How would you describe your level of education?

_____ \$0-15,000

_____ Did not finish high school

_____ \$15,000-30,000

_____ Received GED

_____ \$30,000-45,000

_____ Received high school diploma

_____ \$45,000-60,000

_____ Attended some college

_____ \$60,000-75,000

_____ Received Associate's degree

_____ More than \$75,000

_____ Received Bachelor's degree

_____ Graduate school

6. How would you describe your child's grades?

7. Please list the people that currently live in your home:

_____ Mostly A's and B's

_____ Mostly B's and C's

_____ Variable grades (A's, B's, C's, D's, F's)

_____ Mostly C's

_____ Mostly C's and D's

_____ Mostly D's and F's

8. Has your child ever been diagnosed with ADD or AD/HD? _____

9. Has your child taken medication for ADD or AD/HD? _____

IF YES:

Medication(s): _____

Dates: _____

Is your child currently taking medication? _____

10. Has your child received any other treatment for behavioral or psychological difficulties? _____

IF YES:

What type(s) of treatment? _____

Dates: _____

APPENDIX D

*Self Report Delinquency Scale (adapted from Elliott & Ageton, 1980)***SRD**

Please circle the number of times that you have participated in each activity in the **last year**.

<i>How many times in the last year have you...</i>	<u><i>Number of times in the last year</i></u>				
1. purposely damaged or destroyed property.....0	1-2	3-5	6-10	over 10	
2. stolen (or tried to steal) something worth more than \$50.....0	1-2	3-5	6-10	over 10	
3. knowingly bought, sold, or held stolen goods (or tried to).....0	1-2	3-5	6-10	over 10	
4. thrown objects (such as rocks, snowballs, or bottles) at cars or people..0	1-2	3-5	6-10	over 10	
5. run away from home.....0	1-2	3-5	6-10	over 10	
6. lied about your age to get in somewhere or to purchase something0	1-2	3-5	6-10	over 10	
7. carried a hidden weapon other than a plain pocket knife0	1-2	3-5	6-10	over 10	
8. stolen (or tried to steal) things worth \$5 or less.....0	1-2	3-5	6-10	over 10	
9. attacked someone with the idea of seriously hurting him/her0	1-2	3-5	6-10	over 10	
10. sold drugs (such as marijuana or other drugs).....0	1-2	3-5	6-10	over 10	
11. cheated on school tests0	1-2	3-5	6-10	over 10	
12. stolen money or other things from your parents or family members...0	1-2	3-5	6-10	over 10	
13. hit (or threatened to hit) a teacher or other adult at school.....0	1-2	3-5	6-10	over 10	
14. hit (or threatened to hit) one of your parents0	1-2	3-5	6-10	over 10	
15. hit (or threatened to hit) other youth.....0	1-2	3-5	6-10	over 10	
16. taken a vehicle for a ride (drive) without the owner's permission0	1-2	3-5	6-10	over 10	
17. had sexual relations with someone against their will0	1-2	3-5	6-10	over 10	
18. used force to get money or things from another person0	1-2	3-5	6-10	over 10	
19. avoided paying for such things as movies, food, and bus rides.....0	1-2	3-5	6-10	over 10	
20. been drunk in a public place.....0	1-2	3-5	6-10	over 10	
21. stolen (or tried to steal) things worth between \$5-\$500	1-2	3-5	6-10	over 10	

22. stolen something at school, such as someone's coat	0	1-2	3-5	6-10	over 10
23. broken into a building or vehicle (or tried to break in).....	0	1-2	3-5	6-10	over 10
24. begged for money or things from strangers.....	0	1-2	3-5	6-10	over 10
25. skipped classes without an excuse.....	0	1-2	3-5	6-10	over 10
26. failed to return extra change that a cashier gave you by mistake	0	1-2	3-5	6-10	over 10
27. been suspended from school.....	0	1-2	3-5	6-10	over 10
28. made obscene telephone calls.....	0	1-2	3-5	6-10	over 10

How many times in the last year have you used...

Number of times in the last year

1. alcoholic beverages (beer, wine, and liquor)	0	1-2	3-5	6-10	over 10
• What is the largest number of alcoholic drinks that you have had within one day during the last year?	0	1-2	3-5	6-10	over 10
2. marijuana (pot or weed)	0	1-2	3-5	6-10	over 10
3. hallucinogens (acid, LSD)	0	1-2	3-5	6-10	over 10
4. ecstasy ("X")	0	1-2	3-5	6-10	over 10
5. amphetamines (uppers, speed, Crystal Meth).....	0	1-2	3-5	6-10	over 10
6. cocaine (coke) or crack.....	0	1-2	3-5	6-10	over 10
7. barbiturates (downers).....	0	1-2	3-5	6-10	over 10
8. heroin.....	0	1-2	3-5	6-10	over 10

APPENDIX E

Consent and Assent Forms

THE UNIVERSITY OF NORTH CAROLINA
GREENSBORO

CONSENT TO ACT AS A HUMAN PARTICIPANT:*Form for Parents/ Guardians*

Project Title: Risky Sexual Behavior among Adolescents

Project Director: Megan Key, M.A. Faculty Supervisor: Arthur D. Anastopoulos, Ph.D.

Parent's Name: _____ Date of birth: _____

Participant's Name: _____ Date of birth: _____

Date of Consent: _____

Purpose

There are many reasons why teenagers may take risks. The purpose of this study is to investigate whether symptoms of Attention-Deficit/ Hyperactivity Disorder (AD/HD) are related to teen sexual risk-taking and other risky behaviors. AD/HD symptoms include inattention, hyperactivity, and impulsivity.

Procedure

Your son or daughter will complete questionnaires and define vocabulary words. The questionnaires will include questions about feelings, drug and alcohol use, sexual activity, relationships with parents, and conduct. These forms should take about one hour to complete. Your child will have the option to refuse to answer any questions at any time. Your child will also take part in a short activity to determine knowledge of vocabulary words. In this task, he or she will define words that the researcher says. This task will last about 5 minutes.

This research project also requires a parent or caregiver to complete questionnaires and a brief interview. The questionnaires that you complete will include questions about your child's behavior. These questionnaires will take about 30 minutes to complete. You will take part in a brief interview about your child's behavior. This will last about 5-10 minutes.

Risks and Discomforts:

The risks involved in this study are minimal. Sometimes, parents or teenagers may feel uncomfortable when answering questions. Some of the questions are very personal. You or your child may feel embarrassed to share personal information with a researcher. If at any time you feel very uneasy about the information being asked, you may skip the questions that make you uncomfortable. You may also withdraw from the project without any consequences. If your child

becomes upset while completing questionnaires or during the interview, the researcher will talk about his/her concerns. Your child will be given the option to withdraw from the study or to skip questions without penalty.

You may have concerns about your teenager answering questions about sexual activities. Youth will be asked whether they have had a sexual experience before answering the sexual behavior questions. **Teens who report that they have not had a sexual experience will not complete the questionnaire about sexual behavior.** This means that youth who have not engaged in sexual activities will not be asked questions about sex.

Your teenager will answer personal questions about feelings and behavior. All of your child's answers will be kept confidential. The responses will not be shared with anybody, including yourself. Although answers are kept private, there are a few situations in which a researcher must report a participant's answers to some questions. For example, if youth report thoughts of hurting themselves, the researcher must report this information to ensure the child's safety. You and your child have the option to refuse to answer questions that make you uneasy.

Benefits

To date, little is known about how AD/HD relates to teenage sexual behavior. The results of this study will add to researchers' knowledge about the link between AD/HD and other problems among teenagers. This knowledge can be used to help youth and their families. Your child will also receive a gift card or coupon given by a local business.

Confidentiality

The answers you provide will be kept confidential. Your child's answers will also be kept private. There may be a few cases in which the researcher cannot guarantee confidentiality. If the researcher learns of sexual or physical abuse that has not already been reported, the researcher must report this to the Department of Social Services. If the researcher believes that your child is in danger, the researcher must report this to the Department of Social Services, as well. Again, you and your child have the option to refuse to answer any questions at any time.

Questionnaires and interview information will be identified only by a number. The only people who will see information about you and your child are the researchers involved in this project. Your name will not be used in any reports from this study. The forms that you complete will be stored in locked cabinets. Passwords will protect information that has been entered on a computer. All information will be destroyed after five years.

Consent

By signing this consent form, you agree that you understand the procedures and any risks and benefits involved in this research. You are free to refuse to participate or to withdraw your consent to participate in this research at any time without penalty or prejudice; your participation is entirely voluntary. Your privacy will be protected because you will not be identified by name as a participant in this project.

The research and this consent form have been approved by the University of North Carolina at Greensboro Institutional Review Board, which insures that research involving people follows federal regulations. Questions regarding your rights as a participant in this project can be answered by calling Mr. Eric Allen at (336) 256-1482. Questions regarding the research itself will be answered by Megan Key by calling (336) 256-0088 or Dr. Arthur Anastopoulos at (336) 256-0006. Any new information that develops during the project will be provided to you if the information might affect your willingness to continue participation in the project.

By signing this form, you are agreeing to participate and to allow your adolescent to participate in this project described to you by Megan Key. Should you agree, a description of this project will also be given to your child. After hearing this, your son or daughter will be given an opportunity to give assent for participating in the project.

Parent/ Guardian signature

Witness to signature

THE UNIVERSITY OF NORTH CAROLINA
GREENSBORO

ASSENT TO ACT AS A HUMAN PARTICIPANT:

Form for Minor Adolescents

Project Title: Risky Sexual Behavior among Adolescents

Project Director: Megan Key, M.A. Faculty Supervisor: Arthur D. Anastopoulos, Ph.D.

Participant's Name: _____ Date of birth: _____

Date of Assent: _____

Purpose

There are many reasons why teenagers take risks. I am going to ask you questions to find out more about things that teenagers do and feel.

Procedure

For this research project, you will be filling out some forms and answering some questions. The questionnaires ask about things that happen in some teenagers' lives. Some of these questions will ask you about feelings, drug and alcohol use, sex, relationships with parents, and your behavior. These questionnaires should take about one hour to fill out. You will also be asked to define some words, which will take about 5 minutes.

Your mother or guardian will also answer some questions about you and your family. Your mother's portion will last about 30 minutes.

Risks and Discomforts:

The risks involved in this study are small. Sometimes, teenagers may feel uncomfortable when answering questions. Some of the questions are very personal. If at any time you feel uncomfortable about the kinds of information being asked, please let the researcher know right away. You may withdraw from the project without any consequences. If you feel upset while you are answering any questions, please let the researcher know.

You will be asked some questions about feelings and behaviors that some teenagers have. Some of these questions are about drugs and sex. The researcher will not tell your answers to anyone, unless you report that an adult has abused or harmed you. If you say that an adult has done something harmful, the researcher will have to tell someone for your protection. The researcher also might have to tell your parent if you are in danger of harming yourself or being harmed by someone else. If the researcher decides to report something you say, she will tell you and you can talk about it first. If you are asked questions that you do not want to answer, you may skip those questions or withdraw from the project. You will still receive your gift certificate or coupon.

Benefits

By participating in this project, you are helping adults learn more about the lives and feelings of teenagers. This is useful for people who help teenagers. For participating in this project, you will also receive a gift card or coupon donated by a local business.

Confidentiality

Your answers will not be shared with anyone, even your parents. After the researcher collects your questionnaires, a number will be written on them, but your name will not be on them. The only people who will see your answers are the researchers involved in this project. Your name will not be used in any reports from this study. The questionnaires that you complete will be stored in locked cabinets.

There are a few cases that the information you give might not be kept private. If you say that you have been abused, this information might be reported. Also, if the researcher believes that you are in danger, she may have to tell your parent or someone else. Please remember that you can refuse to answer questions. No one will be upset or disappointed with you, and you will still receive your gift certificate.

Assent

Your parent has already given permission for you to participate in this project. You can make your decision right now about whether you want to be in this project. If you sign this form, it means that you understand everything about the project and would like to participate. If you have any questions about this project, please ask now.

Participant's signature

Witness to signature

APPENDIX F

Recruitment Flyer

*** ATTENTION***

15-18-year-olds and their parents

Do you want to **help** students and professionals learn more about the way teenagers think and feel?

Do you want a **\$10 gift card** to spend at a local store?

If you would like to participate in a research project for teenagers 15-18 years old, contact Megan Key, a UNCG student, at (336) 337-8237 or mbkey@uncg.edu for further information.

All information will be kept confidential.

APPENDIX G

Recruitment Letter

Dear parent or guardian:

I am a graduate student in clinical psychology at UNCG. I am currently the Assistant Clinic Director of the UNCG AD/HD Specialty Clinic. I am also conducting a research project for my dissertation. This letter is to offer you and your child an opportunity to participate in my dissertation research.

What does participation involve?

- A **one-time visit** to your home by a graduate student for 1 hour (or a one-time trip to UNCG)
- The purpose of this study is to investigate whether symptoms of AD/HD are related to teen sexual risk-taking and other risky behaviors
- Youth between the ages of 15-18 and their mothers/ female caretakers are eligible to participate
- The teenager *is not* required to have AD/HD
- Participation will last about 1 hour
- Participation involves completing questionnaires and a brief interview at the participants' home or at UNCG, according to your preference
- ***Youth will be compensated with a \$10 gift card to a local business***

*If you have a teenager between the ages of 15-18 and are interested in participating, please read the information below, provide your name and contact information, and have your son or daughter return this form to his/ her teacher. I will contact you to answer your questions and to schedule your participation at a time that is convenient for you, or you may contact me at the number(s) below. **There is no obligation to participate.***

 Parent(s) name: _____ Child's name and age: _____

Telephone number(s): _____

You may also contact me at:

(336) 256-0063 OR (336) 337-8237 OR mbkey@uncg.edu

Thank you!

Sincerely,

Megan Key, M. A.
Graduate Student

Arthur D. Anastopoulos, Ph.D.
Faculty Supervisor

APPENDIX H

SOCIAL NOMINATION FORM

Thank you for participating in this research project. Please list any of your friends or relatives between the ages of 15-18 that I can contact to see if they are interested in being in this project. I will tell them that you gave me their phone number. They will *not* be required to participate.

Name: _____ **Phone #:** _____

Name: _____ **Phone #:** _____

Name: _____ **Phone #:** _____

Name: _____ **Phone #:** _____

Name: _____ **Phone #:** _____

Name: _____ **Phone #:** _____

YOUR NAME: _____

YOUR PHONE #: _____